Science and Magic in the Modern World: Psychological Perspectives on Living with the Supernatural

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Preface

Acknowledging the existence of supernatural reality, which sometimes quite wrongly is identified with superstitions, is often considered as a violation of the scientific view of the world. At the same time, few people would deny that the world we live in is bigger than the universe studied by physical sciences. Social sciences, such as economics and political sciences, deal with realities that do not conform to the universal and unchangeable laws of nature. It is even more so when it comes to disciplines such as theology and art. Many of the greatest philosophers of all times – Thales of Miletus, Pythagoras, Socrates, Plato, Plotin, Thomas Aquinas, Descartes, Kant, Hegel, Schopenhauer and others – in one or another form admitted that something exists that goes beyond the physical universe studied by sciences. Nevertheless, studies of the supernatural reality thus far have mostly been confined to esoteric theories of magic and witchcraft that are either detached from or stand in a direct opposition to scientific approach to the universe. But could it be the case that supernatural events are as real as scientific ones, and that an ordinary human person lives in the world in which natural and supernatural events are mixed and intertwined? Is it not possible that both natural and supernatural realities coexist in one mind and in one universe? Finally, could natural and supernatural realities cooperate one with the other towards a common goal – to make the life of a human individual more meaningful and manageable? In this book, I will try to answer these questions in the light of recent psychological studies on magical thinking and magical beliefs in modern humans.

Having been involved in experimental psychology for over 40 years, I eventually came to the conclusion that psychological phenomena have little in common with natural phenomena that are studied by physical sciences. Thus, in nature every atom and every molecule are exact copies of other atoms and molecules of the same kind. In contrast, *psychological phenomena are unique:* Every sensation, perception, thought and feeling are impossible to reproduce, they exist only once. It is only with the crude approximation that psychological events can be brought to a common denominator and thus squeezed into the «psychological laws», which to some extent look similar to the laws of physics. Further, we know that natural phenomena comply with the law of physical causality, according to which the same causes always produce the same consequences. Unlike physical objects, *a person's reactions to the same stimuli are always slightly different*. Physical causality is based on four known types of physical interaction: gravitation, electromagnetism, strong and weak nuclear, whereas *psychological causality both inside the mind (e.g., associative thinking) and in interpersonal interactions is based on meanings*. A physical body is passive and totally determined by the laws of nature, while *a person is active, freely determines his or her actions and is able to generate new actions and thoughts «from nothing».*

But if the human mind and actions do not obey the laws of nature, then what kind of laws do they obey? Pondering this question, I more often than not came to the conclusion that *our mind and actions follow the laws of magic*. Magic is a way of comprehending the world that historically and logically precedes science. For millennia people tried to influence nature by magic. Reflecting upon feelings and thoughts of their own, people assumed that animals, plants, rivers and mountains too

have similar feelings and thoughts. By magical spells and rituals people were trying to influence animals and the processes of nature. Science put an end to these illusions, but only in regard to inanimate objects, whereas the mind remains under the power of magical laws. As a result, *the life of modern people evolved as a complex reality in which the laws of magic and science are intertwined*. Even though many scientists in public deny that they believe in magic, in their private life the same scientists often follow the laws of magic. Even in the domain of physical reality science approached the processes that can be described in terms of magic rather than in terms of physics. In other words, *in the modern life magic and science complement each other*. It is this wonderful complementarity phenomenon that I would like to discuss in this book.

In English and other languages the term "magic" (which I will be using interchangeably with the term "supernatural") can have a variety of meanings. In order to make the discussion of the relationships between magic and science comprehensible, we need first to define the concept of magic (the supernatural) that will be used in this book, and then to conceptualize the way magical events relate to scientific ones.

1. Chapters 1, 2, 3, 4, 5, 6 and 9 have been adapted from papers published online in SENTENTIA. European Journal of Humanities and Social Sciences, in 2016 and 2017.
2. A brief version of this book was published in Russian, by Directmedia, in 2015.

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Introduction

Abstract

The distinction is discussed between the concepts of the natural and the supernatural (magical and quasimagical). Magical and quasimagical phenomena and interactions are contrasted to scientific phenomena, and the relations between magic and science are discussed. A brief look into history shows that rational thinking took its beginnings in magical thinking, thus laying the foundation for science. With the progress of science, the scope of reality in which the laws of magic hold sway shrunk but didn't disappear. Our feelings, thoughts, fantasies, communication, and language now, as in the ancient times, comply with the laws of magic. In many domains of reality, magical thinking and scientific thinking coexist and even complement one another. Finally, certain magical phenomena exist not only in human thinking, but in physical reality as well. The introduction ends with outlining the aims of the book and a brief summary of the content.

Magic and science

Science deals with natural phenomena, and magic – with supernatural ones. But what exactly makes a phenomenon "natural" or "supernatural"? Because the terms "natural" and "supernatural" are rather basic, they need to be deduced from some concept that is intuitively clear for most readers. I suggest that our intuitively clear sense of our Self is taken as the basis for the distinction between the natural and the supernatural. The "sense of Self" is the fact that at this very moment I, (and hopefully, the reader

too), am having the feeling of being a certain individual with a name, gender, family and national belonging. [1]

Along with our Self we also clearly have the feeling of something that we usually call the internal and external worlds. The *internal world* encompasses our feelings and experiences, such as headache, the feeling of love or subconscious processes, whereas *the external world* consists of phenomena and ideas that exist outside our Self (e.g., the window in front of us, the wind behind the window that moves the tree brunches, the stars in the sky, or the knowledge of physical laws). The internal world is accessible only to our Self, whereas the external world we share with other people. Our Self, internal and external worlds are parts of a more general concept, which is our Mind (consciousness). The mind (consciousness) therefore is a concept, which creates a final borderline for any sensible analysis. The mind can no longer be reduced to a more general concept. All that exists outside the mind is what Immanuel Kant called "Ding-an-sich" ("Thing-in-itself") – some kind of reality, which a person can only know about through his or her mind (see Figure 0.1)

Figure 0.1 about here

The relationship between our Self and the internal and external worlds is a complex one [4]. In both of these worlds, features can be distinguished that our Self can

[1] Some philosophers claim that Self is an illusion or a by-product reducible to more basic constructs, such as mechanisms of information processing in the brain [1][2][3]. From the perspective taken in this book such theories are misleading, because in order to sensibly talk about any cognitive construct a person first has to have the feeling of Self.

directly control, while other features are beyond our ability of control. For example, in the internal world we can control our attention, e.g., we can fix our gaze at will on this or that object. At the same time, we cannot stop our toothache by simply wishing it to stop, and we are unable to say the name of a famous actor, which we know well, but which at the moment is escaping our conscious effort to recall it.

In the external world there is only one object that our Self can control directly, and this object is our body: Thus, we can move our hand at will, but unable to lift this computer by just thinking about lifting it. Let us call the objects that we can control directly (such as our attention, some of our thoughts or movements of our body) "dependent objects", and the objects that we cannot directly control "independent objects". Usually, the class of independent objects includes all perceived external physical objects, such as inanimate things, animals and other people. It also includes mental objects: The laws of logic, mathematics, and other sciences, as well as scientific theories and mental representations of physical objects – *rational constructions*. A subclass of inanimate independent physical objects is what we usually call *matter*, and a subclass of independent mental objects is what we call *knowledge*. Note that from this theoretical perspective *matter is a part of the mind (consciousness)*. Certain objects within our internal world, such as the feeling of pain or love, obsessive thoughts and subconscious processes, also belong to the class of independent objects (see Table 0.1).

Table 0.1 about here

It is also clear that we can act physical objects with our body: For example, we can lift things with our hands and influence other people with our language. We can also act on mental representations of external objects (rational constructions) using the laws of logic and physics. Let us call this kind of actions the *indirect Self over matter/mind actions*. Contrasting with indirect Self over matter/mind actions are our actions on our own body or mental processes; we will call this kind of action *direct Self over matter/mind actions*. Finally, external objects can act one upon another through physical forces (interaction in physics, chemistry and biology) or through language (social communication between people or between people and certain kinds of animals)(see Table 0.2)

Table 0.2 about here

Now the distinction can be introduced between natural and magical interactions. *Natural interactions* include indirect actions of our Self on inanimate objects (such as a hand lifting a stone), our actions on mental representations of physical objects according to the laws of science and logic, and interactions between inanimate objects, mediated by the known physical forces (for example, a wind moving a tree branch, the Sun attracting the Earth via gravitational force, a quantum particle colliding with another particle). Interaction between chemical substances, biological structures inside an organism, and between living organisms belong to this class as well. In contrast, *supernatural (magical) interactions* are direct actions of our Self on inanimate objects (e.g., our thought moving our body, a magic spell or a wish affecting a physical process), interactions between inanimate objects that is not

mediated by any known physical force (e.g., the entanglement effect), or interactions between nothingness and existence (e.g., emergence of random events or creative ideas).

Semantic interaction occupies the intermediate position between natural and supernatural interactions. Semantic interaction is carried out through physical phenomena – sounds or visual images - but it cannot be reduced to these phenomena. Thus, the meaning of the request "would you, please close the door" cannot be deduced from the energy of sound waves spent on pronouncing and transferring this message. A receptor of this semantic communication performs the action of closing the door not because she hears the sound, but because she understands and approves the meaning of the message that the sound carries. Because the receptor of the message does not conform to the sheer physical force that the sound contains, but complies with the meaning that is carried by the sound, the semantic communicative interaction contains the element of the *direct Self over mind action*; in this sense semantic communication can therefore be classified as a supernatural action. However, because semantic communication affects not an inanimate object but a person, it is not a truly supernatural interaction. Rather, semantic interaction combines the elements of natural and supernatural interactions. We therefore may call semantic interactions *quasimagical interactions*.

By analogy with natural and supernatural interactions, one can talk about natural and supernatural phenomena. *Natural phenomena* are phenomena that are produced by natural interactions. Thus, crystals emerge from minerals dissolved in water as a result of their concentration, stars and planets – from cosmic dust condensed by the force of gravitation, scientific theories result from manipulations with rational constructions of objects in accord with the laws of logic and science, new species of animals develop

through evolution. *Magical phenomena* are phenomena produced by magical interactions. Examples of such phenomena are changes in inanimate objects directly initiated by our mental processes, and physical events that have no physical causes (e.g., a ghost, a random event, or the origin of the universe). Thus, according to the Book of Genesis, god created Earth and the sky from nothing. A creative thought in the human mind or the action of free will appears from nothing too. A special magical phenomenon is *subjective experience* – sensations, perceptions, thoughts and feelings. As long as a person can access the world only through subjective reality, *subjective experience is a part of both natural and supernatural phenomena*. However, natural phenomena, through their rational constructions (knowledge and theories about these phenomena's structure, origins, functions and properties) are connected between themselves by causal links and form the continuum of *everyday reality*. Unlike natural phenomena, magical phenomena don't have a stable basis in rational constructions, are not connected between themselves and form *magical reality*. Because subjective experience is an underbelly of the mind (consciousness) as a whole, it will be considered separately (see Chapter 3).

Finally, *quasimagical phenomena* include such events as a person's mind affecting other peoples' minds without a physical medium (extrasensory perception), and our thoughts and feelings affecting our other thoughts and feelings (see Table 0.3).

Table 0.3 about here

To summarize, the following features distinguish magic from science. Magic is based on the supposition that a person and the things of nature are linked one to the other by some kind of "prearranged harmony" or "understanding". In the magical world, the person can ask or order, and the natural things can understand these requests and orders and comply or not comply with them *(direct Self over matter/mind magic)*; objects that resemble each other (e.g., a person and her photograph) are magically linked one with the other in such a way that if something happens with one of them (e.g., with the photograph), then the same happens with the other (e.g., with the person) at an indefinite distance and in no time *(sympathetic magic)*; if an object is in physical contact with a person (e.g., a piece of clothes worn by the certain person), then this object acquires properties of the person (e.g., the good or bad features of the person's character) as if it is contaminated by some sort of a" magical infection" *(contagious magic)*; finally, invisible spirits can acquire physical form, as if emerging from nothing, and vanish again *(emergence/vanishing magic).* In other words, *in the magical world there is no a watershed between objects that depend and don't depend on the human Self, and objects can interact one with another by transcending the limitations of space and time.* In contrast, the objects that science studies are supposed to be entirely independent from the human Self, and interactions between individual objects, such as galaxies or elementary particles, are constrained by physical limitations: These interactions need a certain medium (e.g., a magnetic or gravitational fields) to conduct a physical causation, require a certain time to proceed, and the speed of physical interactions cannot exceed the speed of light (see Chapter 4 for more details on the difference between science and magic).

A brief look into history

The ancients believed that trees, rivers, the wind and other natural objects and events had minds and souls of their own, with which people could communicate through magical spells and actions. Even in the Dark Ages this animistic belief was still alive. Following Aristotle, people of the Middle Ages believed that living creatures had souls, which made them similar to people. It is not until the middle of the XVII century that mechanistic science emerged in Europe. Rene Descartes and some other philosophers started to view animals as complex machines, similar to a mechanical clock. Eventually, the view of nature as a mechanical process was extended to humans as well. First, a human body started to be viewed as a mechanism, and then the human mind too. A modern version of mechanistic psychology – cognitive science – understands the mind as a direct result of material processes in the brain. Phenomena that in the earlier times were viewed as magical (e.g., heredity as a perpetuation of ideal forms of plants or animals, which existed in the supernatural world of "ideas") today are explained by natural causes (e.g., heredity as the passing of information coded in the genes). Most educated adults today consciously believe in chemistry, astronomy and mathematics, and not in alchemy, astrology and numerology.

As a result of the progress of science, in the modern world reality is often identified with physical reality. But how valid is this identification? We know that the notion of physical reality itself grew out of myth and religion. Moreover, as argued above, physical reality is only a part of reality. The other parts are social and psychological realities: The realities of feelings, thoughts, fantasies, communication and language. These realities do not comply with the laws of science; rather, these realities now, as in the ancient times, comply with the laws of magic. Movies and books for children are full of magical events, and the early children's beliefs in Santa or the Tooth fairy

are even encouraged by adults. Our dreams and art often contain magical characters and events. Finally, in mental disorders, such as OCD and schizophrenia, patients sometimes report experiencing supernatural images and events.

In other words, in the modern world science and magic coexist, and even cooperate one with the other in various domains of life. But how is magic built into the edifice of the modern world, erected by science?

The complementarity principle

Sometimes a phenomenon can comply with two opposite rules or have features that contradict each other. In quantum physics a combination of two opposite features in one object or event is named *the complementarity principle*.

For example, in the XIX century light was viewed as a wave process, until in the beginning of the XX century Einstein suggested that light consists of particles – quants of energy. But how could light be a wave and a particle simultaneously, when properties of waves and particles are so different? Indeed, a particle has certain localization in space, and a wave doesn't. A particle moves along a certain trajectory, and a wave spreads in all directions simultaneously. Research has shown that in the micro world units of matter and energy, such as photons, electrons and protons, do indeed combine properties of waves and particles, and, depending on the situation, behave either as waves or as particles. Scientists had no choice but to accept that the elementary units of matter have opposite properties simultaneously, and this gave birth to the complementarity principle [5].

In a similar vein, some phenomena can combine physical and magical properties. Take, for instance, the Big Bang – the event that gave birth to our universe. According

to modern cosmology, the Big Bang is a physical event, which resulted in the emergence of the four main types of fundamental physical forces – electromagnetism, gravitation, strong and weak nuclear. But at the same time the Big Bang is a magical event, because at the beginning of the Big Bang, called the moment of singularity, the universe must have had an infinite density at a finite time, when the fundamental laws of physics did not apply. In addition, space, time and causality emerged with the Big Bang: This means that the Big Bang itself emerged from nothing, and emergence from nothing is a characteristic of a magical event [6].

Another example of the complementarity between physical and magical properties is the effect of quantum nonlocality [7]. According to this effect, if two elementary particles conform to the same wave function, then a change in one of the particles (e.g., a change of the particle's impulse) is accompanied with a predictable change in the other particle at whatever distance the other particle is from the first particle. It means that the two particles are linked not through any of the four known fundamental physical interactions, which is physically impossible. Accordingly, the nonlocality effect is a physical effect that also has the property of sympathetic magic – the ability of one object to act upon another object at an indefinite distance and in no time.

But perhaps the best example of complementarity is human consciousness. Every thought is undoubtedly accompanied by physical processes, such as transmission of electric impulses in neuronal synapses. However, for the person in whose brain the aforementioned physical processes unfold these processes are represented not as physical events but as subjective experiences, such as sensations, dreams, feelings or thoughts. Subjective experiences cannot be described in terms of physical space. For example, if a person is experiencing pain, this feeling cannot be measured in meters,

weighted in kilograms, described as a cuboid or a sphere, or presented in terms of electromagnetic or gravitational fields. If a damage inflicted to the body is a physical, natural event, then the feeling of pain that accompanies the damage is a nonphysical, supernatural event. Paradoxical as it is, but the reality of mundane everyday subjective experience is a magical, supernatural reality (see Chapter 3 for more on subjective experience).

What this book is about

This book's main aim is to discuss how magical reality is built into reality of various domains of modern life. In Part I of the book (Chapters 1, 2 and 3) the issues are raised of the role of magic in the human mind. In Chapter 1 the argument is presented that art emerges as a means of early humans' communication with gods and spirits. Paintings on cave walls were the first symbols used to reach the domain of the supernatural. More abstract symbols of written language and mathematics eventually branched off art, yet in its original and authentic form art remains the pathway into the realm of the supernatural. Using paintings of surrealist artists, the chapter argues that these paintings address the implicit belief of rational people in magical reality. Harboured deeply in the subconscious, the belief of a modern person in the supernatural resonates with the paintings and elicits in the viewer the feelings of mystery and anxiety, as well as the feeling of insights into the meaning of life.

Chapter 2 is about individual consciousness. The hypothesis is suggested that consciousness is a uniquely human ability to simultaneously dwell in two types of reality: visible ordinary reality and invisible magical reality. This dual structure of consciousness makes humans capable of reflection, creativity and intentional action. But the same duality of consciousness also creates problems for human existence.

One of these problems is the necessity to constantly make an effort of maintaining the borderline between everyday and magical realities.

In Chapter 3 human consciousness is compared with artificial intelligence (AI). An argument is made that it is impossible to deduce subjective experiences from the processes in the brain; on the contrary, scientific theories about the structure of brain processes were initially derived from subjective experiences. This makes subjective experience a supernatural phenomenon. As long as only living entities possess subjective experiences, such experiences, as life itself, cannot be artificially created. In contrast to subjective experience, AI is a product of programming. We can therefore conclude that AI, even in its most advanced forms, cannot simulate subjective experiences. This puts an impregnable barrier between AI and human intelligence. Neurosciences and cybernetics will be creating increasingly perfect interfaces between AI and human intelligence, but there will always be a "neutral strip" of the unknown between "intelligent machines" and human consciousness.

Part II of the book (Chapters 4-6) is about the relationships between magic, religion and science. In Chapter 4 the psychological phenomenon is analysed of a merger between magical and scientific thinking. The analysis reveals that some phenomena and theories in physics and cosmology, such as Copenhagen interpretation of the "wave function collapse", "entanglement" and "many worlds interpretation" of quantum events, include interactions that fit the definition of basic operations of magic: "participation" and the direct "Self over matter" action. Further, the analysis shows that there are historical and logical links between magical and scientific types of thinking. Magical thinking operates through symbols and supplies a thinker with creative combinations of ideas, whereas scientific thinking operates through concepts and selects from the above combinations those that fit the observed reality. The

criteria for this selection are experimental results and correspondence of the creative combinations with general context of available knowledge. When modern physics and cosmology entered the domains where experiments are impossible, such as the "theory of everything" and the origin of the universe, selection of acceptable combinations from the flaw of combinations supplied by magical thinking becomes less rigorous. As a result, "ruptures" appear in the borderline between magical and scientific thinking, through which magical phenomena trickle into physical theories of the functioning and origins of physical universe.

Chapter 5 analyses the paradox of the apparently impractical investment of vast amounts of money into problems such as the origin and distant future of the universe and the search for galaxies that are millions of light years away from our planet. Indeed, it appears that, given the existing problems with local wars, refugee crises, species extinction, endemics and environmental misbalances, billions of dollars invested in the studies of the distant past and future of the universe could be better spent. The chapter argues that the cause of this paradox is hidden in the implicit belief of modern humans in immortality of the human soul and the humankind. Recent studies in psychology have shown that most educated individuals who consciously deny their beliefs in magic or in god in their subconsciousness still harbour the belief in the supernatural. In the recent decades, studies in quantum physics and cosmology confirmed the ancient hypothesis of the inseparable link between the human mind and the universe. The results of these studies, combined with the subconscious belief of modern people in the supernatural, create the hope that the mind of the humankind, and possibly the mind (a soul) of a human individual as well, can be immortal. This implicit hope for immortality makes the studies of distant galaxies and the remote future of the universe meaningful.

In Chapter 6 the origins of modern religions are discussed in the light of the belief of modern people in the supernatural. Historically, modern world religions (such as Judaism and Christianity) branched off ancient magic and maintain a strong link with magical reality. Psychologically, this link is supported by the fact that most educated adults still hold the belief in the supernatural. However, for many people today critical thinking based on the achievements of modern science ousted the belief in magic and in god deep into the people's subconscious. As a result, “existential vacuum” emerged in the minds of modern secularized individuals, and the search for the meaning of life. Various ways of this search are discussed, such as “rational mysticism”, and the attempts to approach magical reality through scientific methods. These attempts include the search for brain localization of mystical and religious experiences, and experimental studies of paranormal phenomena. The basic need of humans for the meaning of life explains the fact that the beliefs in god and in the supernatural survive in the modern rational world.

Part III of the book (Chapters 7,8 and 9) is about applications of magical thinking in various domains of modern life, such as politics, economics, education, and medicine. Chapter 7 raises the issue of how a ruling authority can employ people’s implicit magical beliefs in order to manipulate with mass consciousness. Structure and functioning of a special cultural-psychological mechanism -- the “belief in magic based social compliance” (BMSC) – are analysed via contrasting three modern cultures: Russia, Mexico and Great Britain. Historical origins of BMSC in various cultures are discussed, and modern condition of this mechanism is assessed. Factors are discussed that can influence BMSC in Russia, with the aim of partial liberation of Russian people from the grip of unintentional compliance with the suggestive power of authorities.

Chapter 8 examines the role of magical thinking in children's cognitive development. Recent studies have shown that watching a movie with magical phenomena can stimulate children's' cognitive functions, such as divergent creativity and visual analysis, to a significantly greater extent than watching a similar movie without magical phenomena. A psychological mechanism of this effect is rooted in the systemic nature of psychological functions. The stimulating effect of watching the supernatural effect creates a psychological ground for developing "alternative handbooks" on various subjects (e.g., physics, biology and psychology), in which not the laws of science but the laws of magic would hold sway. Handbooks like that would use magical phenomena as "thought experiments" over reality, which can be employed for a more effective way of teaching science.

The concluding Chapter 9 contains an overview of the ideas discussed in the book, and a brief analysis of magical phenomena that were not analysed in the previous chapters. These phenomena permeate politics, economics, medicine, moral behaviour, human relations and neurosciences. Studies have shown that both children and adults in modern industrial countries, explicitly or implicitly, believe in the supernatural. This hidden belief brings about specific effects in various domains of life, from economics to being in love with another person. The wide spread of interactive electronic displays in the recent decades made access to the imagined magical world incomparably easier than before. This boosts the effects that people's implicit belief in the supernatural makes on their everyday behaviour.

Finally, the epilogue presents a thought experiment, in which the world free of magical reality is described. This thought experiment brings us to the conclusion that in this conjured world many social sours of the real world, such as religious wars,

witchcraft, narco trade and suicidal terrorism, would disappear. But this would be a very dull and uninspiring world, in which few people would like to spend their lives.

Notes

1. Dennett, D. (1991)

2. Dennett, D.C., and Kinsbourne, M. (1992)

3. Carruthers, P. (2011)

4. Subbotsky, E. (2000a,b).

5. https://en.wikipedia.org/wiki/Complementarity_(physics)

6. https://en.wikipedia.org/wiki/Big_Bang

7. https://en.wikipedia.org/wiki/Quantum_nonlocality

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Part I

Magic in the Mind

Chapter 1. The Magic Crystal of Rene Magritte: Art as a Window in the Supernatural

Abstract

The chapter contains analysis of artworks by the Belgian surrealist artist Rene Magritte and the Italian artist De Chirico in the context of paleoanthropological studies of the origins of art and psychological studies on magical thinking. These studies suggest that art originated from the belief of early humans in that next to the ordinary earthly world there exists a magical supernatural world, in which souls of dead people and animals dwell. In order to visualize and represent this magical world, humans created special objects – drawings, sculpture, architecture, and abstract signs and symbols. In the course of history, the belief in the magical world was replaced by official monotheistic religions, and in many modern individuals – by the belief in science. The sense of the magical was transformed into the sense of the aesthetical, and the representation of the supernatural in the form of rock paintings and figurines carved from bone and stone changed into modern art. Yet recent studies on magical thinking have shown that in modern urban inhabitants the belief in magic did not cease to exist, but descended into the subconscious. Although our conscious mind denies the existence of magic, our subconscious mind still believes in that beyond the known world lays the invisible world of the supernatural. In this invisible world the

laws of magic, and not the laws of science, hold sway. De Chirico and Magritte's paintings are the "wormholes" that give modern rational people access to their hidden belief in the world of the supernatural, the existence of which modern science denies.

Problem

There is no excellent beauty that hath not some strangeness in the proportion.

Francis Bacon "Of Beauty" [1]

It sometimes happens that after a long flight we wake up in the middle of the night in a room unknown to us and for a few moments are unable to grasp where we are. Everything around us seems strange: the vague silhouette of the door, the moon light getting through the window, walls and curtains are all in the wrong places. For some time, while our consciousness is hastily restoring the events of the last 24 hours, we are trying to answer the questions "Where am I?" "How did I get here?" And even when our memory puts the broken ends together and gives us the answer, the feeling of being in a strange place doesn't quite disappear.

The same feeling I experienced in Rene Magritte's museum in Brussels. Trees growing from the table set in the middle of a desert ("The Oasis"), a train emerging from a mantelpiece ("Time Transfixed"), a medieval castle on a cliff that is floating free in the air ("Castle in the Pyrenees"), the winged man and a lion on a city's embankment ("Homesickness"). A half man – half fish, a half plant – half bird…. A weird world of images, which are both familiar and strange. Magritte acknowledged that he was indebted for his artistic style to the influence of the Italian artist Giorgio

de Chirico, who founded a movement in art known as “metaphysical realism”. De Chirico’s paintings are particularly strange and disquieting: deserted town squares and strange juxtaposition of enigmatic objects immerse a viewer into a dreamlike world. According to De Chirico, "To become truly immortal, a work of art must escape all human limits: logic and common sense will only interfere. But once these barriers are broken it will enter the regions of childhood vision and dream." [2] This theoretical statement doesn’t explain why the artistic style that escapes the limits of logic and common sense should appeal to a modern viewer, who lives in the world defined by science and logic. The fact is, the appeal is there, and the question is why?

Artworks by de Chirico and Magritte always gave me the feelings of anxiety and unexplained nostalgia. Ambassadors of an alien world, these paintings immerse one in the world, which in one sense resembles our everyday world, and in another sense is fundamentally different from it. Looking at these paintings, I sometimes experienced the phenomenon of deja vu – the sense that in the past I have already seen what these paintings show. It seemed to me that I had been in this alien world, walked these deserted town squares lit by the sun, looked at these strange objects and sculptures. There appeared in me an unstoppable longing to understand the messages of this unusual and disturbing world. Somehow I felt that understanding these messages would help me find Answers to the ultimate questions: “What am I?”, “How did get into this earthly world?”, “What is my destiny here?”, “Where would I go after death?” But however hard I tried to grasp the meaning of the messages, my efforts were in vain. Only the feeling of disappointment, anxiety and an unfinished thought remained. And the new question arose: “To what in our inner world are these paintings trying to speak?” Clearly, these painting are not addressing our aesthetic feeling, if under aesthetic feeling the enjoyment of human and nature’s beauty is

understood. Indeed, neither by the grace of forms nor by the richness of colours De Chirico and Magritte's paintings are no match to the paintings of El Greco or Vincent van Gogh. Nor are they addressing our logical thinking, since logical analysis of these paintings (e.g., "loafs of bread don't fly in the sky") brings nothing but trivialities. Yet somehow answering the above question seemed important. Eventually, and in conjunction with my own research, it occurred to me that one possible answer to this question could be found in psychological studies on the belief of modern people in the supernatural, and in psycho-anthropological studies of Palaeolithic art.

Reality of the supernatural

One of the most striking human psychological abilities is the ability to get habituated to almost everything. Due to this ability most of us, since a certain age, start viewing the world around us as something taken for granted, and even a little dull. The same buildings around us, the same sky over our heads – sometimes grey and sometimes blue – all this makes the world and our life repetitive and poor on excitement. It is hard to explain to most people, scientists particularly, that they live next to the magical, miraculous, supernatural; that their own existence is a fact unexplained. Indeed, one has to make just a slight shift in the point of view – and the magic of the everyday world becomes obvious. Take for instance this house, this tree or this cat running in the street. Each of these objects consists of gazillions of physical particles, but what exactly keeps all these particles together so that they don't dissipate in the surrounding medium like the molecules of salt dissolve in a glass of water? In regard to simple objects like a piece of iron or a crystal of salt, their solid structure is explained by the known physical forces, such as nuclear forces and gravitation; but the physical forces are two general and non-specific to explain the constant structure

of living organisms. Why do the particles of matter that this cat consists from stay in the cat's body and do not dissolve in the air? Why do they stay in separate organs and don't just mix together, like the grains of wheat in a bag? Clearly, there must be "forms" – of this cat and this tree – that keep the molecules in the cat and in the tree. But where are these forms? One can't see or touch these forms; one can only view them by the "mind's eye", by observing the objects that these forms make possible.

The most wonderful is the fact that objects "last" - they exist not for a fleeting moment and then disappear, but stay for some time, which is different for different objects. It is this permanence and stability that the invisible forms give to every complex object, which is the greatest mystery. Even in the emptiness of vacuum there are little disturbances – the so called "quantum fluctuations" [3] – but they only last for infinitesimally short time, while the complex living structures may last for thousands of years. The fact that objects in the world are stable and unique creates the misleading impression of this world's ordinariness. Of course, if a cat could turn into a tree in our full view we would call it a miracle, a magical event. But if we just tried to "compress time backwards" and look at the world through this inverted "time lens", we would see that transformations of this kind happen to objects all the time. Single-celled organisms turn into multicellular organisms, animals develop into humans. We call this process evolution, and because we live inside this process we take it for granted. It seems to us that such transformations of simple things into complex ones are happening "on their own". But, according to the second law of thermodynamics, only the opposite process - the transformation of complex objects into simple ones - can happen on its own. In contrast, transformation of simple objects into complex ones requires some external force that makes such transformation possible and protects the complex objects from immediate disintegration. Darwinian evolution of

species may seem a “blind” process, but how clever it is designed! Random mutations of genes, the struggle for survival of the fittest, preservation of useful mutations in a population – these are only some of the necessary elements of evolution. Someone did a very good job in order to create the “blind watchmaker” (the image of evolution coined by the British biologist and science writer Richard Dawkins [4]). Perhaps, the whole evolution is nothing but a complex “watch”, which, once winded by someone, keeps working by itself. It is also possible that some unknown forces work in evolution, which helps squeeze the time and reduce the astronomical numbers of individuals destined to die for the few lucky to survive. If this is the case, then the blind watchmaker isn’t so blind after all. My feeling is that science has not yet said its last word on the structure of evolution, particularly on explaining why, despite the purposeless nature of natural selection, evolution resulted in the emergence of animals as complex as humans.

And the same creative synthesis happens in inanimate matter, where simple chemical elements are being transformed into complex ones. Yet in the modern industrial world the awareness of the fact that the world is full of miracles became a privilege of children, artists and poets. As children, we believed in miracles. As adults, we could occasionally wake up to this awareness when listening to music by Mozart or watching films by Andrei Tarkovsky; but for the rest of the time this awareness is hidden from us until we face special moments in life, such as a threat of imminent danger or death.

Apart from the “everyday miracles” mentioned above, which are in peace with science, there are things in the world that can't be explained by science. Thus, everyone has a soul, but what the soul is, how we got it and what will happen to it

after our death – to these questions science doesn't know the answers. What is consciousness? Philosophers have been searching for the answer for over two thousand years, but there is still no a commonly accepted theory. Where did the universe come from? Despite all the efforts of cosmologists and physicists to explain the origins of our universe, we are still as far away from the answer as people were hundreds of years ago [5]. We don't even know what a random event is. Scientists are talking of random processes all the time, but what is a random event? By definition a random event is impossible to predict, but then it must be a miracle – a "something" that emerged from nothing. And if a random event is an effect of certain causes, then the event is not random and must be predictable. An example of a random event is a night dream. Psychologists try to study dreams and even influence them, but why we see this particular dream in exactly this form and at this particular moment is impossible to causally explain. And what is creativity? If a creative process could be understood logically, it would turn into an algorithm and immediately stop being a creative process. To logically understand creativity would be as fatal for creativity as stopping a jet in mid air would be fatal for the jet.

So, a modern person in the western world lives in a sort of an "enclosure". The world inside the enclosure is known and explained by science, and the world outside is unknown and unpredictable. For the people of the earlier epochs the size of this enclosure was tiny, and the people well realised the vastness of the world beyond. They tried to speak with the world beyond by praying or chanting magical spells. But for the last four centuries in Europe, and in other cultures that inherited the European style of thinking, the situation changed drastically. The size of the enclosure grew immensely, and for most people the borders between the enclosure and the world outside went out of view. This happened because of the phenomenal success of

science and scientific education. Science denies magic as a false belief. To support its argument, science provided powerful proofs. The industrial revolution, the increase of people's well being and the length of an individual's life, modern medicine and education, flying in the air and space, radio, television and the Internet [6]. Magic couldn't stand such proofs. And it retreated into the "backyard" of consciousness.

It retreated but not vanished. Wizards, astrologists, palm readers keep offering their services in the media, and there is no shortage of customers. Still, the role of the traditional magic in modern western societies is relatively insignificant. Traditional magic takes its strength from people's explicit magical beliefs, and when these beliefs faded the effectiveness of traditional magic weakened as well. Everyday life's magic (love magic, fate reading, astrology) is cognitively too simple in order to satisfy demands of a sophisticated modern mind, which is armed by knowledge and logical thinking. More successful are practices that grew out of magic – religion and psychotherapy. Like magic, religion and psychotherapy exploit the ability of human imagination to affect human thinking and behaviour – the so-called "placebo effect" [7]. But even these "babies of magic" occupy a relatively modest niche in the modern life. Under the burning sun of science religion is fading. Psychotherapy pretends to be a science, but most of its methods are indistinguishable from magic [8]; besides, it takes a lot of time, costs dear and its results are unstable. So, where is a niche for magic in the modern world? Such niche exists, and this niche is *magical thinking*. It is in the context of magical thinking that I would like to ponder over De Chirico and Magritte's paintings.

Magical thinking and the belief in magic

Magical thinking is the *kind of thinking that follows the laws of magic and embraces objects and events, which do not conform to the laws of logic, physics, biology and psychology*. People going through solid walls, animals speaking human languages, gods reading human minds and feeding on the smoke of animal carcasses being burned, time travel – these are examples of magical creatures and events. Magical thinking encompasses the world in which there are no inanimate objects or processes. In this magical world, every object and event has consciousness or a soul of its own. Every entity in this world can be spoken to – one only needs to know the language. Early Egyptians, Greeks and Romans communicated with natural phenomena using the language of magic. Even today in some Catholic cultures they sometimes pray for rain.

Although most educated adults today see themselves as nonbelievers in magic (and some also in God), many nevertheless like to "play" with magic. These "imaginary games" may give us the feeling of power and importance. Plunging into the magical world, with its strangeness and unpredictability, can help us shake off the dullness and boredom of the everyday world. In our dreams we can travel in time, speak with our late relatives, and observe magical transformations of people into animals. Many of us enjoy watching films with magical content (e.g., the Harry Potter or Lord of the Rings series), reading books about shamans and wizards, studying myths of Greece or Egypt, attending exhibitions with pictures of magical and mythical creatures and events, or immersing ourselves in mystical oriental teachings. In our dreams, by using a magic spell we can instantly move to another planet or easily win millions of dollars at a roulette table. Of course, the world of magical thinking is not all fun. Sometimes things can go wrong in the magical world, producing ghosts and dangers, and we wake up in fear. But most of the times in the world of magical thinking we feel to be

in control of events, and we like it. Because our games with magic unfold in the imagination, they peacefully coexist with our beliefs in science and are acknowledged in the western world as legitimate forms of entertainment, art or dreaming. But the hope of "playing with magic" without believing in the supernatural is an illusion.

Psychological experiments of the recent decades have shown that deep in the subconscious most of us believe that the laws of magic have real power. For instance, one of these laws is "the law of sympathy"; according to this law there is a supernatural link (i.e., "sympathy") between a person and the person's image (see Table 4.1 for more on the laws of magic). In many traditional cultures people believed "that by drawing the figure of a person in sand, ashes, or clay, or by considering any object as his body, and then pricking it with a sharp stick or doing it any other injury, they inflict a corresponding injury on the person represented" [9, 1-2]. With the aim to examine whether the "law of sympathy" works with educated people today, psychologists designed an experiment; in the experiment, they encouraged participants to through darts into the pictures of good or bad characters. As expected, participants were less accurate at throwing darts at pictures of the faces of people they like. In spite the participants' clear realisation that hitting a person's photo with a dart cannot possibly hurt this person, subconsciously the participants followed the magical law of similarity and tried not to damage the photo of a nice person [10].

In the world of magic, human Self can directly affect matter. The ancients believed that if a person wanted a certain event to occur (e.g. that another person falls in love with him or her, or his or her enemy dies), and the person performed certain spells and rituals, then the desired event would really happen. Thus, in ancient Rome people used to write damnations or love spells on led tablets and hide these tablets in certain

places, in the hope to get the desired effects – death or love of another person -- with the assistance of the supernatural forces. In order to examine whether people today believe in the direct “Self over matter” magic, participants in a psychological experiment (university graduates and staff members) were first interviewed on whether they believed or didn't believe in magic and then asked to imagine that a professional witch was going to put her spell on their future lives. In one case the spell intended to make the participants rich and famous, and in another – to make them servants to evil forces. In the interview, most participants denied that they believed in magic and acknowledged that the spell would not affect their lives in any way. Yet when they faced the choice between the two spells, they allowed the good spell but not the bad one. Interestingly, the participants rejected the bad spell only in the situation when their own lives were at stake. When asked what they would recommend another person (a scientists and non-believer in magic) to do in this situation, most participants changed their mind and said they would recommend the scientist to accept both spells, in order to prove to herself that she doesn't believe in magic (see Figure 1.1). Unexpectedly for the participants, they behaved as if they believed in the direct “Self over matter” magic [11].

Figure 1.1 about here

In sum, the studies showed that in modern industrial cultures educated adults subconsciously believe in the supernatural. Like a strange subterranean plant with its roots growing upwards, and contrary to our conscious belief in science, our hidden

belief in magic creeps into many domains of modern life: medicine, education, communication, politics, and economics [12][13]. But the area in which our subconscious belief in the supernatural plays a particularly important role is art.

Magical space

Humans broke away from the animal kingdom not when they started making tools, and not when they developed language (some animal species, like apes or dolphins, have these abilities too), but when with the help of their imagination they discovered a "second reality" -- the sacred world in which gods and spirits of dead ancestors dwell, and started to believe in this invisible reality (see Chapters 2 and 6 for more details). This "magical space" proved to be very capacious: along with being a home for gods and souls of departed ancestors magical reality eventually managed to accommodate numbers, letters, schemes, blueprints and nearly everything what is needed for scientific and technological thinking. In order to make this second reality tangible, people developed the first symbols in the form of images, which they carved from wood, stone, and bone or painted on cave walls. It is these early images-symbols that some scientists consider to be the first forms of art [14][15]. In other words, the early art, in the form of carved figurines and rock paintings, changed magical reality from something that initially existed only in the imagination of shamans and wizards into the kind of reality that could be perceived and thus was accessible to everyone. In the course of history, these symbols and images of early art became more abstract and turned into numbers and letters, thus giving birth to mathematics, written language, and science. It seems paradoxical, but in some sense all major branches of modern culture grew out of the common root: they are transformed and diversified forms of magical reality. Like modern continents, which once were one big land mass called

Pangaea, *modern art, science, written language and religion separated from ancient magic millennia ago and have been drifting apart from each other ever since*.

Early burials as for-runners of art

It seems likely that the very first physical representatives of the newly discovered magical world were the objects, which our ancestors put in burials. The earliest burials are considered to be those of Neanderthals, dated by the Middle Palaeolithic (around 300 000—50 000 years ago), however, the absence of any artefacts in these burials makes it questionable that people who were buried there had any idea of life after death. Burials that undoubtedly indicate towards the belief in the afterlife are about 100 000 years old and belong to anatomically modern humans. These burials were found in caves Qafzeh and Skhul in Palestine [16]. Along with human remains, the graves contain various objects: Dear antlers in the hands of one skeleton, sea shells, traces of red ochre on some bones. In later burials (no older than 50 000 years) they found primitive decorative objects and hunting tools. It is possible that the first physical artefacts representing the belief in the world of spirits were not carved figurines or cave paintings but the objects that accompanied a deceased to the world of the afterlife. This suggests that our distant ancestors developed the idea of the parallel magical reality prior to the time when they started to produce first symbolic artefacts worthy to be called art (such as cave paintings and figurines carved from wood, stone and bone). The ancestors believed that objects, which in the real world served practical purposes (a stone axe, a bone scraper, a sea shell), in the sacred space of the burial turned into something supernatural, having passed through into the other world together with the spirit of the deceased. Perhaps, the ability to view a common physical object from this world (e.g., an axe) as representing the same object, which a deceased will be using in the world of the afterlife, was the initial form of symbolic

thinking – the forerunner of the later, more genuine symbols: painted images or carved figurines. This ability of representational thinking was also the first form of sympathetic magical thinking, as it followed the magical law of sympathy: Am image (an imagined axe that will serve the spirit of the dead ancestor) equals an object (the real axe that is put in the grave). Even today, in the course of the individual development children begin with using one object as a substitute for another (e.g., a Lego cube as a substitute for a piece of cheese, a wooden stick as a substitute for a horse), and only later become able to draw images (e.g., the piece of cheese or the horse) on paper. So, it is possible that art emerges as a side effect of burial rites.

Yet, the first manifestations of culture commonly acknowledged to be pieces of art were the cave paintings and figurines carved from stone and bone by people of the Upper Palaeolithic. These paintings and figurines contained images of animals and people, and also characters that combined animal and human features.

A drawing as a magical act

Images painted on caves' walls by the Palaeolithic artists 30-15 thousands years ago were not pieces of art in the modern sense of the word; they were created with the aim of communication with the supernatural – gods and spirits. According to experts on Palaeolithic art – the French anthropologist Leroi-Gourhan [14] and the British paleoanthropologist Steven Mithen [15], the Palaeolithic cave drawings performed magical functions and reflected anthropomorphic and animistic nature of thinking of prehistoric people. Caves with paintings of animals and people were ritualistic sites, in which ancient hunters addressed the spirits of animals they had killed (with the aim of pacifying the spirits) or were hoping to kill (with the purpose of increasing chances of successful hunting). Thousands of years later, in ancient Egypt, Greece and Rome,

gods were also represented and addressed to in the form of painted images or sculptures. Even today some frescoes and icons are being worshipped and believed to have healing powers.

Cave art was the first manifestation of sympathetic magical thinking in people that left its tangible traces. It doesn't mean though that magical thinking appeared with the cave art. In principle, any language requires some kind of representational ability in creatures that speak the language. For instance, in monkeys various yells and outcries may represent specific dangers (a snake or an approaching jaguar), and every monkey learns the language from an early age. But this language of signals is not based on sympathetic magical thinking. For the language to become magical, the *signals* have to turn into *symbols* – images that represent the invisible spirits of people and animals, and are addressed to these spirits. *Magical thinking therefore is rooted in the belief in invisible magical entities* (see Chapters 6 for more on this). In early humans, *spoken language was likely to be the first form of representational magical thinking* (see Chapter 2 fro more details), but we know little about this language. Only when people discovered the way of putting spoken words in the form of paintings, sympathetic magical thinking acquired its firm ground – visually presented symbols. The first symbols that could have developed were pictographs – essentially pictures of objects, like in some Egyptian hieroglyphs. Gradually these early characters interacted with spoken language and became more abstract. But *even modern languages, as long as they use characters or words that represent something, is a transformed form of sympathetic magical thinking.* From modern languages, the magical essence of a spoken or written word – the belief in the invisible spirits – had long evaporated, leaving behind only the "dry skins" of the early symbols. But the cave painting show

that the first symbols were animated by the spiritual content. That may be a reason why the first images were so perfect.

The phenomenon of the Palaeolithic cave paintings' perfection remains an enigma. Images of animals on the walls of Altamira, Lascaux, Shauvet and other caves in Spain and France are unanimously acknowledged as masterpieces of painting, which the best artists of the Renaissance and modernity could envy. As the expert on prehistoric art David Whitley put it, with a few exceptions modern churches, if compared with the prehistoric caves, are filled with mediocre art [17]. Palaeolithic masterpieces were created “at the peak of inspiration”, without any sketches or arbitrary lines; the drawing, paint and carving were made by a single errorless movement of the hand, with no corrections or hesitations. Most surprisingly, cave art emerges spontaneously about 30 000 years ago, without any preparatory stage, and comes to a halt equally spontaneously around 10 000 years ago. For the sole purpose of communication with spirits such grace of the forms and colours seems unnecessary. Rock paintings of the later epochs, and there are thousands of them in various parts of the world, are artistically much more primitive than the magnificent Palaeolithic displays.

So, how can this explosion of artistic creativity and mastery in the time of stone tools be comprehended? Whitley's attempt to explain this phenomenon by assuming that shamans, who created these images, were frequently suffering from bipolar mental disorder (the maniac-depressive psychosis), which positively correlates with creativity, is questionable. Evidence for such correlation is weak; besides, 10 000 year ago shamans did not cease to suffer from similar psychic conditions, yet the production of artistic masterpieces on the rock has never happened again. Perhaps, prehistoric people better than people of later epochs understood that contacting the world of

spirits could only be done through creating masterpieces of art. But then why don't we see sketches, awkwardly and erroneously made and subsequently wiped out or patched lines and colours? Or perhaps, the shamans-artists created the images while being in an “altered” state of the mind, and when the artists subsequently recovered the state of vigilant consciousness they were unable to replicate their own creations. We don't know. All we know is that around 30 000 years ago there appeared painted images that were extremely gracious and performed the function of communication with the magical world. Let us investigate whether this fact can help us answer the question of what makes the “metaphysical masterpieces” by De Chirico and Magritte so poignantly attractive and mysterious.

The belief in the supernatural and modern art

Stonehenge (a prehistoric stone circle monument in England), pyramids of Egypt, medieval gothic cathedrals in Europe are known as masterpieces of architecture. Yet they were created not for enjoyment by the beauty of architectural design, but for communication with gods. Modern architectural masterpieces (skyscrapers of New York, Eifel's Tower in Paris, tower blocks of the City of London, Stalinist skyscrapers of Moscow) by their forms look similar to pyramids and cathedrals, but their functions are purely utilitarian. Why then, when we are looking at some of the modern skyscrapers, we still feel aesthetic pleasure? Could it be because these magnificent buildings are reminiscent of the ancient magic, of the delight and mystery of communication with the supernatural? Recall that cave paintings and prehistoric figurines, just like pyramids and cathedrals, originally were not the objects of art – they were idols, the objects of worship. It was millennia later, in ancient Egypt, when images of gods and spirits (as well as people who were associated with gods - kings and priests) became to be perceived as beautiful and started to elicit aesthetic feelings

in viewers. Still later, in ancient Greece and Rome, paintings and sculptures of ordinary people (athletes, fine young women) were included in the family of beautiful objects. This historical link between the divine and the beautiful suggests that the aesthetic feeling is a converted form of what originally was the feeling of communication with the mystical world of magical reality, and what we today view as beautiful objects in our distant past was regarded as objects of religious devotion.

This transformation of *the mystical into the aesthetical* happened in music as well. According to Greek mythology, the inventor of music Orpheus addressed his songs to gods and spirits. He was able to draw tears of happiness from gods and people and thus to influence them and manipulate them. Being a son of god, Orpheus knew how to make sounds, which the spirits living in trees and stones could hear. Another poet, this time a real person, Homer, begins his poem "Iliad" by addressing gods "Sing, O goddess, the anger of Achilles son of Peleus" [18]. Just like the art of painting, music and poetry were originally a prayer, the way of communication with the supernatural. The entrancement that the listeners experienced when communicating with gods through sounds, by gradually loosing its magical context, eventually grew into the feeling of aesthetic harmony. Music and poetry became art when they ceased being a magical incantation.

One more area, which grew out of magical communication with gods, was mathematics. In Babylon, ancient Egypt and ancient Greece numbers were objects of worship; they had a mystical connection with gods, people's fate and natural and cosmic phenomena [19]. Gradually, the belief in the divine essence of numbers disappeared and people started to view numbers, with the exception of a few (e.g., numbers 13 or 666), as abstract symbols. But the existence of the fundamental constants (such as the speed of light, the fine structure constant, the Newton's

constant of gravity, and Planck's constant) in cosmology [20] or the "magical number seven plus minus 2" in psychology [21] supports Pythagoras' idea that the universe and human consciousness are built on the foundation of numbers [22]. Unlike science, art is still holding the memory of numbers being a part of magical reality. It is no coincidence that in some paintings God-creator is shown holding a compass in his hands. The very process of transformation of objects of religious devotion into the objects of aesthetical admiration happened with the help of a number – the so-called "divine proportion" [23]. In art, the proportion determines human beauty as well. You change the "ideal proportion" of a human body – and the beauty of the body vanishes. In a sense, Plato was right: a beautiful person or a beautiful object are beautiful because they were "touched" by the hand of god, and producing a beautiful poem requires assistance from divine powers [24].

To summarise, art emerged out of magic, like Aphrodite rose from sea foam. Due to various reasons, in modern urban cultures the sense of being in touch with magical reality has waned, and the symbolic body of magical reality – paintings, sculptures, architecture, music, and poetry – turned into aesthetic reality. Pyramids and cathedrals turned into skyscrapers and tower blocks, images of gods and spirits turned into paintings of modern artists, and magical incantations turned into songs of poets and music of composers.

One might ask: and what about religion? Isn't religion's thinking a kind of magical thinking? From the psychological point of view, it is. Paradoxically, some modern religions, which, like art, evolved from ancient magic, have been trying to wipe out all traces of the magical "umbilical cord" that connected art to magic. In Judaism, Byzantium orthodox Christianity of the VIII-IX centuries and in Islam painted images of animals and people were banned. Traditionally, this ban is interpreted as the

struggle of monotheism with paganism [25]. But in reality it was a fight of a consolidated religion with the ancient magic, which monotheistic religions viewed as a competitor in the struggle for human minds. Magical reality has always been visually presented to ordinary people through tangible images in paintings and sculpture, starting with Palaeolithic cave paintings and finishing with sculptures of gods in early Egypt and classical Greece and Rome. Paintings and sculptures were symbols that represented gods and spirits in which people believed. To undermine people's contact with magical reality, it was necessary to destroy symbolic representations of this reality. That is why Islam forbids creating images of living creatures. In Christianity, in the Middle Ages the art of painting was preserved and in the Renaissance period it even flourished. Yet, under the pressure of religion, the link between objects of art and magical reality was fading and submerging into the subconscious. It was no coincidence that in most Renaissance paintings and Russian icons gods, angels and saints were shown in a realistic manner as ordinary people; to reveal the divine nature of these characters artists had to supplement these images with special features. Angels had wings; holy men and women had a halo (a ring of light) above their heads. There are only a few paintings in which the artistic mastery is so powerful that supernatural characters can be recognised without special features attached to them. This immediate recognition of the divine nature of a painted character we can experience, for example, while looking at Leonardo's "Giaconda". Like blood was spilling on the character's hands and feet in the portrait of Dorian Grey, in the picture of Giaconda the supernatural seems to trickle from the fabric of the painting. Perhaps, the association with the divine is the secret of powerful enigmatic attractiveness of this portrait of an otherwise ordinary young woman.

Another factor that assisted the conversion of the mystical into the esthetical was modern science, which emerged at the edge between the XVI and the XVII centuries AD. The mechanistic view of the world and a human being, which is characteristic of modern science, undermines the belief in the spirituality of man and nature and, as a consequence, weakens the belief in the supernatural [26]. This mechanistic view further promotes secularisation of modern art. In spite of this, art still maintains its link with the magical world. Science made people's thinking and beliefs more rational, but was unable to change the nature of people's emotions, perception and communication. Thus, science rejects the so-called "argument from intelligent design", which was put forward by the British theologian William Paley in 1802. If, when crossing a field, I came across a stone – Paley reasons – I would be likely to think that the stone has always been there. If, however, I came across a watch, I would think that a craftsman had made it, because it is unlikely for a mechanism as complex as the watch to have emerged on its own. Regarding of whether the universe and a human being were created by God (the creationists' point of view) or evolved naturally (the evolutionists' point of view) theorists still argue, though in science the view prevails that the universe and animal species evolved as a result of chance mutations and natural selection [4].

In art, the situation is different. In order to create a beautiful portrait or woodland scenery, an artist can't be inspired by the knowledge that this person or this wood evolved from the chaos of random processes. Rather, the artist is inspired by the idea that beauty in man and nature proves the presence of the divine designer. God created beautiful wood scenery, and the artist's task is to re-create this scenery in the picture, by preserving the scenery's beauty. In this sense, painters of the realistic trend in art, such as Rubens or Rembrandt, are "intuitive creationists" and magical thinkers.

The way art affects people is similar to magic as well. Art appeals not to our logical thinking, but to our perception and feelings. People's communication through images and language is not based on physical causality (see Table 0.3 in the Introduction). Physical causality is a transfer of a force from one object to another by means of one of the four known fundamental types of interaction – gravitational, electromagnetic, strong nuclear and weak nuclear [27]. In contrast, communicational interactions, though they include physical processes - light and sound, transmit not a force but a meaning. For instance when we ask a person at a table to pass a saltcellar, we cause an action, which cannot be reduced to physical energy that we spend on speaking the words. Human portraits that were created by great artists speak to us not by words but by a gaze. A philosopher Oswald Spengler called this effect "an enigmatic action at a distance". "An enigmatic action at a distance – he wrote – permeates… from the world of the piece of art to the world of the viewer. Even in the early Florentine and Rhenish paintings…one can still feel traces of this magic" [28, p.461]. In other words, a piece of art is a "wormhole", which connects one person (e.g., a portrait's character) with another (a viewer), one historical epoch (displayed in the painting) with another (the time of the viewer), and one kind of reality (magical) with another (everyday reality).

Artist as an "avatar" of magical reality

Every artist, explicitly or implicitly, hopes to be an instrument through which gods (or, to put it in modern terms, our subconsciousness) speak to us. Since the dawn of time, gods speak to people through the chosen ones – shamans, priests, and people of art. Even for those chosen getting access to gods isn't simple: It requires coming into the "altered states of consciousness". A shaman enters the state of trance, in which he or she jungles incomprehensible utterances. By interpreting these utterances the listeners

derive directions and revelations received from gods. The creative work of a modern artist unfolds in a similar way. In a sense, a peace of art is a prayer, shaped in the form of paintings, sculptures, music and architecture. Because the language of gods doesn't have to be clear to mortals, the artist's creation doesn't have to conform to ordinary logic. The American abstract artist Jackson Pollock “spoke with gods” by throwing paint on a canvass, others, like Pablo Picasso or the British figurative artist Francis Bacon were “listening to their subconscious” in a more comprehensible manner, by creating images that remotely resemble commonly known objects. Yet in modernist art (abstractionism, surrealism, cubism, expressionism) most masterpieces are not fully comprehensible either to the viewers or, for that matter, to the artists themselves. Classical paintings, though partially, are accessible to most people's understanding, but the museums of modern art are “libraries with coded messages” from the world unknown to us. Visiting a museum of modern art, an ordinary person has a sense that paintings and installations he or she is looking at contain “something”, but for a more profound understanding most people would need “an interpreter”. Perhaps, modern art accentuates our intuitive association of art with magic, yet what exactly links modern art with the realm of the supernatural warrants an explanation.

Abstract art as a magical experience

If realistic fine art has its clear links to Palaeolithic cave paintings, then what is the origins of abstract art? What relation do the seemingly bizarre patterns of colours and shapes, like those created by the Russian artist Kasimir Malevitch have to the magical images covering the walls of the stone age caves? It turns out that a thread can be found that connects even these abstract paintings to the magical universe. To begin with, abstract forms have a very old history. Hieroglyphs of Egypt and China, Sumerian writings on clay tablets, abstract shapes painted by aboriginal peoples of

Australia, tattoos by peoples of Pacific islands were invented thousands of years ago. Even more old are prehistoric notches carved in wood, stone and bone.

According to ancient Chinese legend, emperor Fu Xi saw a dragon coming out of the river, which was carrying mysterious abstract patterns written on its back. These signs, or trigrams, copied by Fu Xi, represented the fundamental principles of reality; they laid the foundation of the philosophy Bagua that interpreted the structure of the universe and the role of humans in it [29]. The Russian art-critic Paola Volkova [30] draws a parallel between the abstract art movement called Suprematism and the magical ancient trigrams. According to Volkova, the suprematists' forms, such as the famous "Black Square" by Kasimir Malevich, are carrying a hidden "impulse of energy" - a capacity to evoke in a viewer the feeling of tension and the appreciation of the beauty of plain objectless shapes and colours. The aesthetic of Suprematism is widely used in modern architecture (e.g., in shaping tower blocks and skyscrapers), technical design and sport.

Extending the parallel made by Volkova, one can assume that the abstract symbolism of our ancestors, which was incarnated in hieroglyphs and trigrams, originally performed the role of magical incantations. In the course of transformation of the mystical into the esthetical this ancient symbolism evolved into the aesthetic of modern abstract art. The provoking patterns of shapes and colours created by abstract artists today have no explicit association with magic, yet implicitly they carry the capacity to trigger in the viewers emotional feelings, which in our distant ancestors were triggered by hieroglyphs and trigrams. Without challenging our scientific worldview, abstract art creates visually coded magical incantations - the "energy generating" psychological tools - which elicit aesthetical emotions that earlier were elicited by communication with the magical world.

The aforementioned expert on Palaeolithic cave art David Whitley pointed out that there is a link between the rock art of Upper Palaeolithic and abstract paintings by David Hockney and Vasiliy Kandinsky [17]. Whitley believes that a feature common to the Palaeolithic and modern artists is synaesthesia - a neurological phenomenon in which stimulation of one sensory pathway leads to automatic, involuntary experiences in another sensory pathway. For a person with synaesthesia one kind of sensation, for instance, the sense of colour might acquire properties of another kind of sensation, such as the sense of smell, taste or touch (e.g., smoothness, roughness or waviness) unique for each colour. Synaesthesia can occur when a person is in the state of trance – an altered state of consciousness – in which shamans brings themselves during their ritual dance, and modern artists can also bring themselves while working on a sculpture of a painting. According to South-African archaeologists Lewis-Williams and Dowson [31] Palaeolithic art was created by shamans in the state of trance. In this state, the brain can release the so-called “entopics” - special visual patterns that are caused by processes happening within the observer's own eye (zig zag lines, dots, grids, spirals). When the state of trance intensifies, these entopic images can grow into sensible shapes that resemble animals, people or fantastic creatures, which neurologists might interpret as visual hallucinations evoked by trance [32]. When in this state, a shaman enters the realm of magical reality, in which he or she can meet creatures (e.g., half-man, half-beast) and events (e.g., people that can fly in the air or breath under water) impossible in the real world.

Whatever the neurological explanation of the origin of abstract shapes in the mind is, psychologically these shapes were interpreted by shamans as a proof that they reached the magical world of spirits and can now communicate with gods. If the belief in the supernatural still lurks at the bottom of the mind of educated urban inhabitants, then

modern peoples' subconscious emotional reactions to the objects of abstract art may be similar to the reactions that our distant ancestors experienced at the presence of the divine.

Conclusion: Magical image in the modern world

So, what mystery is hidden in Magritte and de Chirico's paintings? Why, when looking at these paintings, we experience a disturbing feeling of being on the doorstep leading into the unknown and enigmatic world? Why is there feeling of déjà vu? Why do we feel that these paintings might give us answers to the fundamental questions: "How did we get into this earthly world?", "What are we here for?", "Where will we go when we die?"

Trying to find a clue to this mystery, we turned to the studies on the origin of art and on magical thinking in modern people. These studies show that at the very beginning of art lies the people's belief in that next to the ordinary everyday world there exists a magical supernatural world in which gods and spirits of dead ancestors dwell. In order to visually represent this invisible world and communicate with the spirits people created special means – paintings, sculpture, architecture, abstract signs and symbols. In the course of history, the belief in the magical world of spirits was replaced by the belief in god, and in many people today – by the belief in science. The feeling of the mystical turned into the feeling of the aesthetical - the feeling of appreciation of beauty or good taste - and the means that made the magical world visible turned into modern art.

However, psychological studies on magical thinking today have shown that the belief in the supernatural in modern educated individuals did not disappear, but descended

into the subconscious. Although consciously we deny that we believe in magic, subconsciously we can't help feeling that beyond the predictable world of everyday reality there exists the mysterious world of the supernatural. In this invisible world the laws of magic, and not the laws of nature hold sway. We had been in this magical world before coming into this earthly world, and we will return to this world after we die. Our education, scientific knowledge and logical thinking have built defences, which protect us from this "memory of the subconscious". But there is one niche in the modern world in which these defences are powerless, and this niche is art.

In myths and fairy tales a person can turn into a beast, fly in the air, breath under water. Magical creatures similar to these mythological characters abound in modern art as well. Picasso's Minotaur, the bizarre combinations of animal and human features in "bio morphs" by Salvador Dali and Francis Bacon, people flying in the sky in the paintings of Mark Chagall – these are the images of a magical world snatched by the artists' inner vision from their subconscious. Artists of the Renaissance, with a few exceptions (Breughel, Bosch), portrayed the world by using realistic images; in contrast, in the XX and XXI centuries artistic language becomes increasingly magical. What challenges in the modern world does this artistic language respond to? May be, the language of magic is the artists' response to the "excess of rationality" that surrounds a person in the modern industrial world? Or, perhaps, secularisation created the "metaphysical void" in the heart of a modern rational person – the void that modern artists try to fill by returning to the ancient language of communication with gods – the language of magical symbols and images?

It seems to me that paintings by Magritte and De Chirico are the quintessence of the art's historical memory, which takes us back to the art the Upper Palaeolithic. By their mysterious paintings these artists, like none other in the modern world, call us up to

acknowledge that what we see in the everyday world, what we believe in - is only a tip of an iceberg. There, beneath the surface of everyday reality there is another - magical, supernatural world - and we are not alien to that world. We were there, and will be there again. And our belief in the supernatural, which is hidden deep in our subconsciousness, silently responds to this call. It seems to us that in this mysterious invisible world lie the Answers to many enigmas of our earthly being, and Magritte's paintings right now, in the next hall of the museum, will deliver the Answers. Yet the paintings only lure us further and deeper into the unknown, and away from everyday reality, but the Answers keep slipping through our fingers.

Did Magritte know the Answers? I doubt this, because the one who knew the Answers would not be interested in looking for them. But perhaps, when Magritte died in his Brussels's home at the age of 68, he saw the Answers.

Notes

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Chapter 2. The Invisible Reality: Consciousness as a Gaze in the Magical World

Eugene Subbotsky

Abstract

The chapter argues that consciousness is the ability to simultaneously live in two types of reality: Perceived everyday reality and invisible magical reality. At some point around 100 thousands years ago, humans became aware of the inevitability of personal death and developed the idea of afterlife – the reality in which spirits of dead ancestors dwell. They also discovered that the spirits have unusual properties: They are invisible, immortal, can read people's minds and feed on smoke from burning sacrificed animals. Due to these discoveries humans became able to look at their everyday world from another perspective and were surprised that their world was designed very differently from the world of ancestral spirits. That was the moment when consciousness as we know it was born: the ability to view the everyday reality "out of the box", from the perspective of gods. This ability of reflection gave rise to new forms of behaviour: Executively controlled action and moral behaviour. Around 30 thousand years ago people developed the way to tangibly represent the invisible world of spirits through signs and symbols, such as cave paintings or figurines made from stone and bone. At the same time, or shortly afterwards, people started using symbolic means for utilitarian purposes, for example, for memorising numbers of killed animals or manufactured items of clothes. Eventually, symbolic reality gave birth to written language and mathematics. But the emergence of consciousness, along with achievements, also created psychological problems. The main of these problems was keeping everyday and magical realities apart. To make this possible, a new psychological mechanism emerged: The "effort of realities distinguishing" (ERD)." It

took millennia for the ERD to achieve the level of perfection it has in modern humans. Like the heartbeat, the ERD in modern humans is automatized and subconscious. Disturbances of the RDE result in phenomena such as mental disorders, mystical visions, and religious radicalism. Recent psychological studies revealed that the early humans' belief in the supernatural lives on in the subconsciousness of modern rational people; it feeds people's magical thinking and makes the ERD ever more important.

Problem

It may be that our role on this planet is not to worship God but to create him.

Sir Arthur C. Clarke [1]

Imagine that sitting on a bench in a shady park you obliviously slipped into a daydream. And here, as if by a beck of a magic wand, all the hard problems you have been trying to solve for years are suddenly cracked. Millions of euros are won in a lottery and converted into yachts, private jets and apartments in the world capitals, the world learns of your existence, newspapers write about you and people look at you with admiration. Gradually, however, your thoughts are switched back to the urgent tasks of the day: You think of what you have to do at work, remember your hard conversation with the boss the other day, make plans for tomorrow. You recall that you had promised to call your sick friend in a hospital and that you need to pop in the food store to get some potatoes. Having shaken off the captivating enchantment of the daydream, you return to the mundane and stressful world of the *perceived everyday*

reality (PER) and have to attend to its demands. When falling asleep late at night you go through the events of the day in your mind, this time slowly and relaxedly, until the river of dreams hugs you and carries away in an unpredictable direction. Day follows a day, and in the vanity of the days you somehow fail to notice that a half of your lifetime, and perhaps more than a half, you spend in the invisible reality of the past and the future. The invisible reality of plans, dreams, fantasies and memories, like a ghost, accompanies every moment of your life.

Having looked at this invisible reality more closely, you might notice that it consists of two domains. One is an imaginary copy of PER. Suppose, having arrived at your office you discovered that you had left your watch at home. While trying to remember where exactly you might have left the watch, you mentally scan every nook and cranny of your flat: Is it in the drawer? On a coffee table? On the pedestal near your bed? Your flat with all its content is stretched before your mental eye like a blueprint or a map, which represents the real flat in one-to-one correspondence. Let us call this mental copy of PER the *imaginary everyday reality* (IER). Within IER, objects and events, as well as the laws of nature and society, are the exact copies of their real life prototypes. Imagined objects and events that have no prototypes in the modern world but could be created or could happen in the future (futuristic prognoses, images of technical inventions that do not contradict the laws of nature but are too complex to be created in the current state of technology) belong to IER as well. Finally, IER also includes memories of past objects and events that ceased to exist (e.g., memories of historic events, images of people who passed away). Another domain of the imaginary reality contains objects and events that cannot have prototypes in PER. In your dreams you may imagine yourself having superhuman skills, for instance, being able to read other people's minds, or fly in the air like a bird. In this department of

invisible reality the laws of physics, biology and psychology are suspended: You can travel back in time, ride flying horses, see mythical creatures (e.g., centaurs, mermaids) and talk to gods. In the introduction, we called this domain of imaginary reality *imaginary magical reality* (IMR). As follows from the introduction, magical (supernatural) reality is not exclusively imaginary. There exists a number of supernatural phenomena that can be perceived, directly or indirectly, via effects that these events have on perceived objects. This class of phenomena constitutes the *perceived magical reality* (PMR). The interface between domains and types of reality is shown in Table 2.1.

Table 2.1 about here

Both IER and IMR can be made tangible in the form of *symbolic representation, through* pictures, movies and verbal descriptions (see Chapter 1). In every bookshop there is a section of "fiction", with books that contain fictional but realistic events and a section of "fantasy", where the books depict fantastical events. Museums too usually have separate sections for realistic painters (such as Manet) and painters that depict fantastical magical events (such as Dali). A similar division into fantastical and realistic departments exists in cinematography. With the onset of computer era one more form of visualization of invisible reality became possible - virtual reality [2]. An important psychological feature of invisible reality is that it becomes a part of social life only when converted into artificial reality of signs, symbols, and images. When we imagine magical evens, we too have to convert them in symbols, words or images.

As mentioned in Chapter 1, psychologically people departed from the animal kingdom not when they acquired the ability to use tools, language and social cooperation. Some species of mammals, birds and even insects can use simple tools, communicate through signals and use complex forms of social behaviour [3][4][5]. It is the ability to live in the invisible reality that separated the human mind from the animal one. Animals can use their imagination for solving practical tasks. In Wolfgang Köhler's experiments chimpanzees were able to understand they could reach a banana that was hanging high under the ceiling in the centre of the cage, if they moved a box from the corner of the cage to the centre and stood up on it [6]. Primates can use "tactical deception" of other animals [7] and even humans [8] in order to get an advantage in reaching food. However, animals' imagination can't go beyond the situation available "here and now". An animal is chained to the world of perception; only a mental leap into the future could free the animal from this psychological captivity. But a leap like that requires imagination powerful enough to break away from the ground of perceptual experience. In this chapter, the hypothesis is discussed that *it was this leap into the invisible reality, which gave rise to consciousness, i.e. to "knowledge about knowledge".*

The following questions arise: When in the course of anthropogenesis did the people invent the invisible reality? What cognitive prerequisites made this invention possible? What event triggered this invention? What challenges in the life of early humans did the invisible reality respond to? How did the invention of magical reality change the human mind? How do people manage to tell everyday reality from magical reality?

The puzzle of the Upper Palaeolithic

According to the theory of evolution the early ancestor of modern humans (Hominina) separated from chimpanzees (Panina) in Miocene (about 6-7 million years ago), as a result of an adaptation to a changed environment [9]. One theory suggests that this adaptation was a transition from living in trees to living on the ground (savannah hypothesis) [10]; another theory argues the transition was from living on dry land to semiaquatic existence in shallow waters (the aquatic ape theory) [11]. Eventually this early ancestor evolved into the genus Homo: Homo habilis (2.8 million years ago), Homo erectus (1.76 million years ago) and Homo antecessor (1.2 million years ago). These human ancestors were bipedal, could use fire and tools, yet essentially they still belonged to the animal kingdom. Anatomically modern humans evolved in Africa around 200 thousand years ago and migrated out of Africa sometime 50 to 100 thousand years ago. However, for about 150 thousand years behaviour and tools of anatomically modern humans, with a few exceptions, did not differ from those of their archaic ancestors. Approximately 50-30 thousand years ago, in the Upper Palaeolithic period, a sudden advance in cultural development was noted, in the form of complex tools (e.g., traps for catching animals), cave art, figurines cut from bone and stone, more structurally complex dwellings and trade [12]. It is at this time, and relatively suddenly, that humans developed symbolic thinking and art. And here the question arises of what caused this Upper Palaeolithic “cultural revolution”, which brought symbolic consciousness into being?

Discovery of personal death and the idea of afterlife

The founder of British anthropology Sir Edward Taylor proposed that the belief in the world of spirits originated from subjective experiences of early people, such as dreams and hallucinations [13]. Having taken these subjective images for reality,

people created the invisible world of gods and spirits and started to believe in this world, thus making an error of judgement. Taylor's theory is an early case of reductionism - the tendency to reduce higher mental functions (e.g., consciousness) to basic cognitive mechanisms hard wired in the brain by evolution (e.g., thinking and dreaming). Modern British anthropologist Robin Dunbar suggests that religion and story telling could only emerge on the basis of spoken language, and of all animal species only humans had language advanced enough to make religion and story telling possible [14]. In his view, only when next to the real world people created the imaginary world they were able to look at the real world "out of the box" and ask why this world is as it is. Dunbar writes about two types of imaginary worlds: The fictional world of story telling and the "parafictional" world of spirits. The parafictional world differed from the fictional world in that people believed that the world of spirits existed not only in their imagination but also in reality. This interpretation of the origins of religion is not without its merits, but it also runs into a problem, because in order early humans could develop language that allowed telling stories about invisible entities, the humans already had to have the idea of the imaginary world of spirits.

Indeed, what exactly distinguishes human language from animal language? In their communication, animals use a complex system of auditory signals, but these signals are tied to the world available in their perceptual field. A scared antelope gives a cry when it sees or smells an approaching predator; an angry dominant lion lets a growl to remind the rest of the pride who the boss is. In contrast, a human word carries a meaning that is not chained to the perceptual field. Early hunter-gatherers could speak about animals they were going to hunt, or plant roots they were going to dig for, without seeing the animals or the roots. But how could the idea of the invisible

meaning enter the minds of early humans, without them already being able to think of the invisible entities of some kind in the first place?

A plausible way to account for the origins of human language is to view the language as a result of animistic beliefs. In the beginning, early humans develop the idea of a soul, or a spirit, that inhabits the living humans, and the invisible world of the afterlife. Gradually, the humans started to extend the area of objects that had invisible spirits inside, bringing into that area animals, plants and other natural objects. Only on this ground people could start thinking and talking about people and objects that are not there, by addressing invisible souls of these people and objects as if the addressees were in fact present. This *identification of the person's or the object's spirit with the real person or the object was the beginning of sympathetic magical thinking.* At the same time, *this was the beginning of meaning carrying words*. It is likely therefore, that *the first spoken word, which was specifically human, was a noun, and that noun meant "soul" or "spirit".* When speaking about absent objects, people were addressing the objects' spirits. As the animistic beliefs faded, the spirits were converted into meanings – the cognitive constructs which are no longer associated with the invisible souls or spirits hidden in the objects. But even today, most languages bear the traces of their animistic origins. For instance, we say, "the sun is rising" or 'the wind is blowing", as if the sun and the wind are living entities capable of active goal-directed behaviours. The anthropomorphic nature of language unmistakably indicates that once a spoken word was a magic spell, addressed to a sentient supernatural entity – a spirit or a soul. To summarise, *the belief in the invisible world of spirits, or the early religion, must precede the emergence of meaning carrying language.* But if the people didn't have language before they

acquired the idea of the afterlife in the form of the spirits, how could this idea emerge?

Answering this question, American neurobiologists Neuberg, d'Aquili and Raus adopted a more existential approach [15]. They see the origin of the belief in the afterlife in the human need to cope with the fundamental unpredictability of life. Unlike animals, humans were able to get aware of the fact that they are mortal beings, and this awareness caused a deep feeling of frustration. Inventing the idea of the afterlife helped to reduce the frustration. Natural selection favoured the individuals who believed in the afterlife over those who did not. Viewing the fear of death as the cause of inventing religion is not a new idea. Among the famous scholars who shared this view were Roman philosopher Lucretius (95-55 BC), anthropologist Bronislaw Malinowski, physicist Albert Einstein and many others [16]. British philosopher Bertrand Russell wrote, "It is not rational arguments, but emotions, that cause belief in a future life. The most important of these emotions is fear of death." [17]. Let us have a closer look at when and how people discovered that they are mortal, and why this discovery might have made them generate the idea of the invisible world of the afterlife.

Burials with artefacts (tools and decorations) placed in graves are the first available signs suggesting the belief in afterlife (see Chapter 1). The earliest burials of this type are around 100 thousand years old and belong to anatomically modern humans [18]. Though disputed, evidence suggests that the Neanderthals, who coexisted with anatomically modern humans for thousands of years, also left this kind of burials [19]. There are observations that even some animals – chimps, elephants and other mammals - act as if they understood that a dead or dying conspecific is in a special

state [20]. But the animals don't project death of a conspecific onto themselves. It appears that only humans had imagination powerful enough to be able to realize that what happened to their deceased tribesmen would also happen to them. In order to be able to invent the idea of life after death, people first had *to discover that life will end in death for each of them* and be shocked by this realization. The most important cognitive ability that made such a discovery possible was the imagination, since unlike death of their tribesmen, the person's own death was always in the invisible reality of the future.

To summarize, the gradual and slow development of certain cognitive skills (thinking, and imagination) in early humans created necessary prerequisites for the discovery of personal death, and *the feeling of frustration and fear* that resulted from this discovery gave birth to the idea that death is not the end of a person. Leaving his or her dead body behind, a person lives on as a spirit. This was the idea of the afterlife.

With the idea of the afterlife, and for the first time in human history, the initially monolithic mind split into two parts: The visible everyday reality and the invisible reality of the supernatural. This was a time in human evolution when the human mind acquired a totally new feature – *consciousness. We can now define consciousness as the ability to live in two realities simultaneously: In the perceived everyday reality (PER) and in the imaginary magical reality of the supernatural (IMR)*. The acquisition of consciousness was not a momentary event. It may have taken thousands of years before the idea of the afterlife became permanently established in the minds of early humans. In its early stage, consciousness existed as the belief in the invisible world of spirits and revealed itself in the form of ritualistic burials with grave goods, and early animal cults. Having invented the idea of an invisible entity – a spirit –

people started to populate with spirits objects of the perceived world as well. The sun, a mountain, a river, a tree, and an animal became bodies with spirits of their own living inside them. Thus, the birth of consciousness was also the birth of a religion we now call animism, and the emergence of meaning bearing language.

Nevertheless, the slow progress of material culture in the Middle Palaeolithic indicates that the early consciousness made little impact on human behaviour. Tens of thousands of years may have passed before this early "pre-symbolic consciousness" acquired a new language – the language of symbols.

The emergence of symbolic consciousness

Analysis of the origin of art (see Chapter 1) suggests that images of animals and people in the Upper Palaeolithic cave paintings opened the doors into the invisible magical world where spirits of animals and deceased ancestors dwelled [21]. It appears therefore that the division of reality into the two domains - perceived everyday and invisible magical reality - that emerged in the Middle Palaeolithic was elevated to a higher level in the time of the Upper Palaeolithic. *A new type of consciousness emerged – the symbolic consciousness*, which portrayed the invisible world of the afterlife through painted or carved images and sculptures. Unlike spoken word, which exists only for a fleeting moment, a painted image lasts. In a painted image, the invisible spirit, which was hiding in the meaning of a spoken world, found a stable ground. Thus a symbol was born. In the beginning, the symbol was a pictograph – a picture of the object or an animal whose spirit the symbol represented. Gradually, mixing with the spoken word, symbols became more abstract, gradually turning into signs and characters of written languages and mathematics.

Symbolic representation made the invisible world accessible not only to shamans, who invented the magical world, but also to ordinary tribesmen. Visual images of spirits and magical incantations opened the possibility to communicate with gods and spirits in a similar way people used to communicate with each other. But there was more to the first symbols than just tangible representation of (and the means of communication with) the magical world.

The important feature of pictorial (a drawing on the wall or a figurine cut of bone) or auditory (a spoken word) symbols is that they are polysemantic, e.g., they can represent more than one thing at once. For example, a drawing of a mammoth on the cave wall could represent a spirit of the mammoth, which was or would be killed, but it can also represent a living mammoth. It was thus possible for the people to start using symbols for representing not only the divine world of spirits, but also things that surrounded them in everyday life: Living animals they hunted, animal skins they manufactured, roots and fruits they gathered. Having initially created symbolic language for visualisation of the invisible and communication with the spirits, people discovered that symbols could also represent mundane things. So, instead of dealing with real things (e.g., looking for a real animal to kill) people now could deal with symbols representing these things (e.g., with a picture or a word representing the animal they were planning to kill). This ability to operate with substitutes of real things opened the ocean of possibilities, such as remembering, thinking, making plans and building imaginary scenarios. In other words, initially people discovered symbolic language in order to speak with the invisible reality of spirits, but the side effect of this discovery - the representational thinking – fundamentally changed the way the people processed perceived everyday reality, by moving operations with material objects from perceptual into the mental plane.

To summarise, the emergence of symbolic thinking changed *the early consciousness*, which thus far consisted from only two domains: Perceived everyday reality and imagined magical reality. On one hand, in the everyday world there appeared a *new domain of reality* – the imaginary everyday reality (IER), which contained symbolic representations of objects and events of perceived everyday reality (PER). On the other hand, portraying invisible magical reality through visually presented symbols made the *already existing world* of the afterlife more complex and diverse. This diversification of imaginary magical reality (IMR) culminated in ancient Egypt, with the detailed descriptions of the underworld, the kingdom of the dead and all the magical creatures and deities that populated Egyptian mythology. In Judaism, Christianity and Islam, the pantheon of traditional deities of polytheistic religions changed into demons and angels that dwell in inferno and paradise, sharing these invisible realms with the souls of deceased people. Even in the modern time the filling of IMR keeps changing, with many rational adults converting gods into technologically advanced aliens or time travellers from the future.

Though much later, another type of magical reality – the perceived magical reality (PMR), was also diversified. Initially PMR consisted of the "gods that can be seen" – the sun, the fire, a totemic animal. Today, it is hard to find a culture that would worship the sun or the fire; however, scientific explorations in the last four centuries discovered phenomena that can be observed (directly or indirectly) yet do not obey the known laws of nature. These phenomena include both psychological (e.g., an act of free will, and act of creativity, parapsychological phenomena), and natural (the Big Bang, quantum non-locality, a living cell) objects and events. Altogether, while the filling of the "departments of consciousness" changes with history, the structure of modern individual consciousness remains essentially the same as it was in the Upper

Palaeolithic, and consists of two domains (everyday and magical realities) and four sections : PER, IER, PMR and IMR (Table 2.1).

Functions of consciousness

Some anthropologists noted that apart from communicating with the divine, art also had a utilitarian function of preserving information [22]. This conclusion follows from such artefacts as bone plates covered with parallel lines, which probably designated the quantities of valuable objects, e.g., killed animals or processed animal skins. Eventually signs and symbols designating mundane objects (tools, animals, clothes) developed into a language devoid of referencing to the divine and aimed at representing imaginary everyday reality (IER).

Although symbolic consciousness is linked to other psychological functions (e.g., sensation, perception, memory, language, thinking and imagination), it cannot be reduced to these functions; it also is not a sum of these psychological functions. Consciousness has a structure and functions of its own. As argued above, the structure of symbolic consciousness includes four related but separate sections of reality: Perceived everyday reality (PER), imaginary everyday reality (IER), perceived magical reality (PER) and imaginary magical reality (IMR). The crucial feature of consciousness is that it has a bipolar structure, in which everyday world (represented by the PER and the IER) is juxtaposed with magical world (PMR and IMR); this juxtaposition of two cardinally different types of reality allowed early modern humans to break away from captivity by the PER and look at the PER out of the box, as if "from the perspective of gods". This newly formed ability of reflection – looking at the PER from the perspective outside the PER – drastically *changed human social behaviour*, by opening the door to executive control and critical thinking. It became

necessary for people to watch themselves in order not to offend invisible creatures – gods and spirits. The invisible and ever-present eye of gods made it possible for rules of morality to enter the human life.

Indeed, before the invention of the IMR people's social behaviour must have been similar to social behaviour in animal groups and was based on instincts and learning through conditioning. The discovery of the IMR changed that. There appeared controlling agents – gods and spirits – who superseded the power of tribal leaders and were never asleep. For example, if a person didn't share his or her food with other members of the group, this might offend the spirits, who then may punish the offender. The onset of symbolic consciousness, which happened in the Upper Palaeolithic, also *revolutionized human thinking*, moving operations with physical objects inside the human mind and thus opening the way to science.

In sum, consciousness created the ground for morality, science and philosophy, but it also made human life more complicated by forcing people to maintain the division between everyday and magical realities. Having created magical reality, people were now forced to constantly coordinate their own behaviour with that of the creatures who populated IMR. Let us call the process of maintaining the division (the borderline) between everyday and magical realities *"the effort of realities distinguishing"* (ERD). For a long time in history the ERD mechanism was imperfect and people frequently conflated the worldly and the divine. This conflation was manifested in superstitions, visions, everyday magic, magical healing, witch hunting and other psychological and social phenomena. Eventually, the ERD mechanism improved and became automatized. In the everyday life of a modern mentally healthy person ERD functions subconsciously and is rarely noticed, like we rarely notice our

heartbeat. However, life becomes more troublesome when, under certain conditions, ERD mechanism starts faltering. Let us consider some of these conditions.

Voices of gods and schizophrenia

The etching by Francisco Goya “The sleep of reason produces monsters” depicts a person immersed in deep sleep, his reason dulled by slumber and bedevilled by monstrous creatures that prowl in the dark [23]. From the perspective presented in this chapter, this picture is a symbol of the disturbed ERD, when the magical world trespasses on the world of everyday reality. So, when does the ERD emerge in the course of individual development of a modern person?

Psychological research indicated that from the age of 4 to 6 years children become able to distinguish between perceptual objects (e.g., a perceived cup), imagined objects (e.g., an imagined cup) and fantastical objects (e.g., a flying dog) [24], yet only adults can formulate what the differences are. Further research revealed that educated adults view imaginary realistic objects (e.g., an imaginary spoon) to be as stable and permanent as their perceived prototypes; by contrast, they regarded fantastical objects (e.g., a cat with the fishtail) as unstable and in constant danger of turning into another fantastical creature (e.g., a flying dog) [25]. These data show that the ERD is not hard wired into the brain and matures gradually with age. The development of consciousness that took millennia in human evolution, in a modern child is squeezed in the time span of years. Luckily, modern children don’t have to invent the idea of the invisible world of the supernatural: This world is made ready for them, in the form of fairy tales, toys with magical abilities, pretend play, books, movies and, today, computer games as well. Even living adults for a small child look almost like gods. Bouncing from their interaction with the supernatural, children

quickly develop symbolic thinking, executively controlled behaviour and eventually, symbolic consciousness (see Chapters 8 and 9 for more on this process). Still, almost till they reach the age of teens, children often confuse everyday reality with the reality of the supernatural. Only in the age of adolescence children develop the ERD ability in its mature state. And they do need this ability.

In the everyday life, when we are doing or seeing something (e.g., speaking with another person or watching a movie), we automatically assess the actions (words) of the other person or the movie clips as belonging either to ordinary or to magical reality. If we see a person who is talking loudly to someone invisible, we may be in doubt about this person's normal state of mind. This silent assessment of other people's behaviour "on normality", which is mostly subconscious, is ERD in action. But have people always been able to employ ERD as smoothly and effectively as they to it today?

American philosopher Julian Jaynes hypothesised that approximately up to 1000 BC the people lacked the ability to reflect upon their own thoughts [26]. In certain circumstances people took their own thoughts for voices of gods and obeyed these voices unconditionally. In other words, ancients experienced auditory hallucinations similar to those in today's schizophrenic patients. In this type of mind cognitive functions were divided between two parts of the brain: One part of the brain was "speaking", and the other was "listening and obeying". For instance, the voices of gods that characters of Homer's Iliad heard was not a literary metaphor, but an accurate description of the voices, which the people of the times described in Iliad heard. When the ability of self-reflection finally evolved, people stopped hearing voices; however, under serious mental conditions, such as schizophrenia, the ability of

self-reflection gets blocked and the patients begin to hear voices, which they sometimes still attribute to gods [27].

From Jaynes's hypothesis it follows that before 1000 BC the belief in the divine reality was already there but the people were unable to keep visible and invisible realities apart and the ERD mechanism was not yet formed. This hypothesis remains controversial and was criticised for insufficiency of evidence, both historical and neurological [28]. From the perspective presented in this chapter, historically the ERD mechanism must have appeared in people much earlier then Jaynes suggests; this mechanism probably evolved in the Middle Palaeolithic as a result of the discovery of the afterlife. The reason is that without the ERD early people would constantly confuse the mundane with the divine, thus making it hard for themselves to effectively function in the everyday life, both socially (e.g., communication during hunting or war) and biologically (e.g., coping with all the chores of daily life). Conflation of everyday and magical realities did indeed happen throughout all history, but it happened in the form of superstitions rather than hallucinations. For instance, ancient Romans believed in household deities, which protected the home (the Lares). These deities were represented by small idols and treated as members of the family; yet there was still the understanding that the idols *represented* the gods, whereas gods themselves lived in a realm of their own. Occasionally people indeed reported seeing images or hearing voices from the realm of the supernatural (e.g., images of pagan gods, mythical creatures, Christ or Virgin Mary), but those were exceptional cases and not a stable feature of consciousness. The ancients may have been superstitious, but they were not zombies. They must have felt being under the constant surveillance of gods, yet still had the ability of making free choices.

Nevertheless, Jaynes illuminated important features of consciousness: The division of reality into the ordinary and the supernatural, and the difficulties that arise from the necessity to live in both of these realms at once. Today, the life in the split reality most clearly reveals itself in the phenomenon of *magical thinking*.

Magical thinking and the pay for consciousness

Both children and adults are happy to immerse themselves in the world of magical thinking. We enjoy watching films with magical events, reading books about magic, pondering mystical paintings by Salvador Dali. In dreams we fly in the air, see animals speaking human languages, travel back in time. In the world of magical thinking, like in the pavilion of distorting mirrors, the everyday and the magical, the possible and the impossible are freakishly intertwined. In this world the laws of physics, biology and psychology are suspended. We are pulled to this world by its strangeness, novelty and tantalizing unpredictability. In the world of magical thinking we rest from tiring dullness of the everyday life. Apart from resting, the immersion in the magical world performs other useful functions: It stimulates creative thinking, helps us to get rid of frustrating experiences, gives us the feeling of strength and control over our lives [29][30].

Since magical thinking unfolds in the realm of imagination, our excursions into the world of the supernatural go well together with our belief in science. Our minds maintain the borderline between the world of everyday reality, in which things obey the laws of science, and the world of magical thinking where the laws of magic hold sway. This juxtaposition between magical and everyday realities is important for education, since the laws of science become more salient when bounced from the laws of magical reality [31][32]. Going through the adventures of Alice in the Wonderland,

admiring magical feats of Harry Potter and his friends, a child becomes aware that the everyday world is built on different grounds and obeys different laws. This awareness helps children better understand and remember the laws of physics and other sciences. It also facilitates the development of executive function – the children's ability to consciously control their thoughts, attention and actions [33]. But, as mentioned above, the ability to distinguish between the magical and the physical doesn't come naturally. Studies have shown that before the age of 10 years ERD is unstable and magical reality can easily trespass on the everyday world [34]. Even in an educated adult the ERD mechanism can fail, which results in *magical thinking turning into magical behaviour*. Let us consider what happens when ERD is undermined.

Physical science tells us that we cannot affect inanimate matter in a way other than through one of the four known physical forces: Gravitation, strong and weak nuclear, and electromagnetism. Indeed, we cannot make the sun rise by just thinking hard about it, or cause a car accident to a person whom we dislike by wishing him or her to have an accident. What physical science doesn't take into consideration is the fact that our thoughts and wishes exist not in the physical world, but in the world of other thoughts and wishes. Yes, our thoughts cannot directly affect physical objects, but they can influence our other thoughts and emotions. Psychological studies have shown that if a person had thought about something to happen (for instance, that a certain person has a car accident) and such event did really happen, then contrary to common logic the person develops a sense of guilt and feels responsible for the accident. This fusion between thoughts and real events can bring distortions in people's behaviour by converting routine actions into magical rituals. Distortions of this kind are particularly pertinent to people suffering from obsessive-compulsive disorder (OCD) – a mental disorder when people feel a need of doing certain actions,

which in reality have no effect on their lives. For instance, a person with OCD may feel an urgent need to frequently wash his or her hands or check if a door is locked, because not doing these actions might put the person in danger [35]. Consciously people with OCD understand that there is no a causal link between their compulsive actions and real life, yet they find it hard to abstain from ritualistic behaviour. Although OCD affects only about 2.3% of people [36], in certain circumstances most people intuitively follow the laws of sympathetic magic, according to which a magical link exists between two events or objects that are causally unrelated one to the other, such as a person and the person's picture. For instance, one study have shown that drinks that had briefly contacted a sterilized, dead cockroach become undesirable and that laundered pieces of clothes previously worn by a disliked person were less desirable than those previously worn by a liked or neutral person. The study also demonstrated that participants rejected acceptable foods shaped into a form that represents a disgusting object [37]. The results of this study suggest that at the level of psychological mechanisms of disgust and fear of contagion, which is mostly intuitive, the ERD faints and human behaviour begins to follow the laws of sympathetic magic.

One more condition when of the ERD mechanism relaxes its grip on the mind is dreaming. One way to examine this is to study people’s emotional reactions towards magic in the state of sleep. In the Western mind-set magic is associated with dark forces yet contains a degree of fatal attraction. This ambiguous attitude towards magic is exposed in some masterpieces of fiction, such as Goethe’s “Faust” and Thomas Mann’s “Doctor Faustus”. Because of this duality in the cultural disposition, people’s feelings towards magic are mixed. On one hand, people are curious towards magic and eager to experiment with it, but on the other hand they are fearful that

involvement with magic may harbour hidden dangers. In the light of the day, when people's consciousness is active and the ERD mechanism is at the peak of its power, people do not usually show any fear of magic, which they view as something purely imaginary. But would they be equally bold when they have to deal with magic in the state of dreaming? To examine this, educated adults were offered a magic spell that aimed at helping them to see their chosen night dreams [38]. Some of the participants declined the offer, but the majority accepted it. The results indeed showed a slight increase in the number of chosen target dreams seen by participants who accepted the offer; however, these participants also saw significantly more scary dreams and nightmares than those who had declined the offer (see Figure 2.1). This suggests that despite their conscious disbelief in magic, when dreaming the participants were anxious that involvement with magic might have a price to pay and this anxiety resulted in them seeing bad dreams. Like the experiments described in the previous paragraph, this experiment demonstrated that in the state of sleep ERD is weakened and people start taking magic seriously.

Figure 2.1 about here

Importantly, under certain conditions ERD can falter in people even when they are in full possession of their conscious critical thinking. These conditions take place when a certain authority (e.g., a political leader, a priest or psychology experimenter) claims that magic could indeed work, and a person's disbelieve in magic is deprived from social support (e.g., when the person has no one around with whom the person might

share his or her doubts about the validity of the claim). To examine this possibility, participants (university undergraduates and staff members) were asked to imagine that when they were walking alone in a dark empty street, a professional witch approached them and offered to put a magic spell on them, which might harm them in the future [39]. Although in an interview the participants denied that the magic spell could change anything in their future lives, they nevertheless acknowledged that they would not allow the witch to proceed with her spell, and explained their decision by admitting that the bad spell might indeed adversely affect their future lives. To their own surprise, the participants discovered that in this situation they behaved as if they consciously believed in magic.

To summarize, the price we pay for consciousness is the necessity to keep magical and everyday realities apart. Only maintaining this distinguishing effort non-stop, which requires a serious investment of mental energy, guarantees normal functioning of consciousness. There are conditions though (e.g., when our critical thinking is suspended or when the risk of disbelieving in magic becomes too great) under which the ERD psychological mechanism starts faltering. But what happens when ERD fails entirely?

Consciousness disturbed

One of the forms of failed ERD is *religious extremism*, when the values of the invisible world of the supernatural supersede the values of everyday reality. Psychological and social causes of religious extremism remain unclear [40]. There are reasons to think that religious extremism is a main factor in framing a suicidal terrorist. Psycho-anthropological analysis of Palestinians ready to become suicidal terrorists showed that they did not differ from other members of their social

environment in educational background, wellbeing or mental health. The only feature that distinguished radicalised Palestinians from their ordinary compatriots was intensity of their religious zeal and the belief that their destructive actions are sanctioned by god [41].

Causes of failed ERD in *mental disorders* are studied more thoroughly. University male students who scored higher on their MMPI Schizophrenia scale also scored higher on the Magical Ideation scale [42]. Schizophrenic patients showed higher propensity to resort to magical thinking in reasoning than a control population of similar age [43]. Schizophrenic patients with hallucinations and OCD patients were found to score higher on the scales of superstition and responsibility beliefs in relation to one's own thoughts than the clinical control group and the non-clinical group [44]. These data suggest that a schizophrenic mind is vulnerable to intrusions of magical reality into the reality of everyday life. Moreover, phenomenology of hallucinatory states in schizophrenic patients shows that the content of magical reality, which trespasses onto everyday reality, is culturally and historically conditioned.

Indeed, Russian psychiatrist Victor Kandinsky (1849-1889) described hallucinations of schizophrenic patients that he and his foreign colleagues observed; these descriptions show that many of the hallucinations were influenced by the patients' religious beliefs. For example, one of the patients reported seeing a demon who spread his black wings over the whole St Petersburg; another patient experienced the vision that he was looking down at the “abyss of hell” and saw the devils going in and out of it; still other patient hallucinated that she turned into an angel, grew wings and “flew a long distance” [45, p.17]. Sometimes visions of paradise and inferno included images of mythical creatures. One patient reported that he was in paradise that looked

like a nicely decorated room in which strange animals resembling a mix of dolphins and small dogs were jumping. Finally, often patients reported having a telepathic communication with god or the devil. But is the content of schizophrenic patients' hallucinations today different from that of the patients who lived over a 100 yeas ago? If it is, then one can expect to hear reports about UFO's and aliens instead of angels and demons. Memoires by Arnhild Lauveng, born in 1972 in Norway, support this expectation [46].

When she was 17 years old, Lauveng was hospitalised with the diagnosis of schizophrenia. Later she recovered and became a psychologist. She recalls that in the hallucinatory states she saw various animals (wolves, crocodiles, rats) that sometimes were of unusual colour and size; however, the animals behaved according to their nature. For example, wolves nibbled her legs to the bone and rats could bite but none of those creatures spoke human languages or could fly in the air. She also heard voices and saw images of people. For instance, a slim woman wearing blue and red dress at once represented solitude. The woman was silent and looked like one of her former teachers. Altogether, Lauveng's hallucinatory world looked more like imagined everyday reality than like magical reality. However, in her hallucinatory world there were some details that violated the laws of the everyday reality: Distortions of space (e.g., a pavement border seems a few meters in depth instead of a few centimetres), unexpected appearances of creatures in places where they were not supposed to be (e.g., wolves in a hospital ward), incompatible colourings of objects (e.g., a dress which is blue and red at once, orange crocodiles). Other patients in Lauveng's ward saw aliens, Martians or spies.

Lauveng suggests that hallucinations are not arbitrary images but reflect a person's life experience and symbolically represent some unresolved problems. For example, in her past Lauveng associated rats with the "rat races" – the image of "winning for the sake of winning" rather than for achieving some sensible goals. Lauveng argues that "races" of this kind are imposed on a person by society, and the rats in her hallucinatory world represented her disappointment with the fact that much of her life was given to this kind of meaningless and forced activities. Interpreting hallucinations as symbols unequivocally links them to magical reality, for the language of symbols is the language of magical thinking (see Chapters 1 and 4 for more on this). More important, the content of Lauveng's hallucinatory world clearly shows its link to the cultural-historical background. When Lauveng fell ill she was a Scandinavian teenager living in a technically advanced and not very religious country in the end of the XX century. It is not surprising that, unlike hallucinations of schizophrenic patients described by Kandinsky, hallucinations of Lauveng and other patients in her ward involved images taken from cultural context of their time (e.g., animals, aliens, Martians, and spies) rather than images inspired by religious faith.

These examples demonstrate that the ERD failure in schizophrenia allows magical reality to trespass on everyday reality and be perceived by patients as voices and images. The staff of this "invasion army" is conditioned by cultural context and the patient's life experience. It is important to note here that in the normal state of mind a person too can experience a strong pressure from images of magical reality (e.g., mirages, visual illusions, stage magic, experiences during film watching and book reading). Yet in the normal state of mind these images are perceived as illusions and kept at bay. For instance, Victor Kandinsky described "pseudo hallucinations" – experiences that felt real but were nevertheless perceived as not real. Pseudo

hallucinations can be experienced by both patients with psychiatric conditions and people in the normal state of mind. Kandinsky argues that “proper hallucinations” trick perception and consciousness at once, thus making a person view his or her fantasies as if they did really exist. By contrast, pseudo hallucinations trick perception alone, whereas consciousness keeps functioning normally and qualifies pseudo hallucinations as fantasies.

Altogether, in both mentally healthy (e.g., religious extremists) and mentally disturbed (e.g., schizophrenic patients) people the failure of the ERD means trouble, both for the people and for their social environment. Still, as French philosopher Michel Foucault noted, if in the modern world people who confuse the real with the supernatural are not highly praised, their position is far not as bad as it was a few hundred years ago [47].

A witch as an intruder from alternative reality

In the Middle Ages people with schizophrenia were viewed as possessed. In the face of Holy Inquisition (XII to early XIX centuries) the ancient hostility of Christianity towards magic became an official institution. Not all those accused of witchcraft by Holy Inquisition were insane, but all the people with schizophrenia were under suspicion of their involvement with black magic [48]. In the Inquisition’s view, by treating human illnesses witches challenged the authority of the Catholic Church, for they revolted against the illness, which is the punishment imposed on people by god for the people’s sins [49]. American psychiatrist Thomas Szasz pointed out that magical medicine violated the church’s monopoly on deciding when a person should live and die; by helping poor and weak, a white witch undermined the traditional hierarchy of the medieval society: The authority of a priest over an ordinary

parishioner, of a lord over a peasant, of a man over a woman [50]. The episode of confrontation between Simon Magus and Saint Peter described in the apocryphal Acts of the Apostles [51] got its real life analogy in the confrontation between a witch and Holy Inquisition.

Yet, despite centuries of persecution, witchcraft in medieval Europe was not eradicated. The reason is that for a long time medical doctors were a privilege of rich and famous, while ordinary people were left with no choice but to rely on a sorceress. Apart from magical rites, white witches possessed valuable knowledge of curing properties of herbs, what may have laid the foundation for scientific medicine. While some of the methods of magical medicine indeed led towards science, others relied on the law of sympathetic magic, and tried to cure a patient by the transfer of an illness from the patient to another person or an animal. Today, the "magical component" of the medieval magical medicine condensed into modern homeopathy, but the traditional magical methods of healing are still used by modern practicing sorcerers [52]. Interestingly, in spite of the impressive success of scientific medicine, psychiatry still bears some features of the medieval attitude towards a patient.

Indeed, in the view of modern psychiatry, mental disorders result from malfunctioning of certain mechanisms of brain chemistry, rather than from possession by evil forces. Nevertheless, as Thomas Szasz noted, modern clinical assessment of psychiatric patients has something in common with the "ordeal by water". The ordeal was used in the XVII century England for testing a person's connection with the devil: A person accused of witchcraft was thrown into the water with her or his hands tied. If the accused person sank, she was considered innocent, while floating indicated witchcraft. The advocates of this ordeal argued that water was so pure an element that

it repelled the guilty. In any case, the accused had no chances to stay alive. Similarly, in the modern times a psychiatric assessment of a person suspected of schizophrenia is frequently based on the bias that the subject is ill, which practically guarantees that the symptoms of the illness will be found. A Google search for "schizophrenia and witchcraft" brings over 300 thousand results. To some extent, in the layman's view today schizophrenics are still associated with the unwelcome guests from the realm of the supernatural. The disturbance of the borderline between the everyday and the supernatural realities still evokes the irrational fear in most people.

Altogether, having emerged in prehistoric times as the person's ability to live in two realities at once, consciousness fundamentally changed human psychology by making human behaviour executively controlled and giving raise to the concepts of morality, freedom of action and personal responsibility. By looking in the distorted mirror of the supernatural, people created art, symbolic language, and ultimately modern religion and science. But the pay for consciousness was high: Mental disorders, witchcraft, witch hunting, Holy Inquisition, suicidal terrorism, and religious radicalism.

Conclusion: Birth of consciousness and the Big Bang

In the beginning of this chapter we asked the questions: When in the course of anthropogenesis did people develop the idea of invisible magical reality? What caused the emergence of this idea? How did the discovery of the invisible magical reality change the human mind? How do people manage to distinguish between everyday and magical realities?

The archaeological findings revealed that around 100 thousand years ago humans began to bury their tribesmen and put in the graves tools, decorations and other artefacts. This suggests that the people developed the idea of afterlife – the invisible reality in which spirits of the dead lived. Cognitive development provided necessary precursors for the discovery of the inevitability of death; among these precursors powerful imagination was a key factor. Of all the animal species, only humans were able to escape from captivity of the immediate perceptual field and grasp the idea that sometime, in the invisible reality of the future, every living person is destined to die. The people saw that a person with whom they lived, communicated and hunted together, due to some reason suddenly became a breathless body, and realised that the same would happen to all of them. This realisation caused an existential shock. By refusing to accept the fact of death, people assumed that the deceased lives on but left his or her body and passed into another realm with that part of him or her that they called a spirit, and today we call a soul.

Starting from there, it was easy to conclude that spirits of the dead possessed unusual properties: They were immortal, invisible, could read people's minds and feed on the smoke of burned sacrificed animals. Having made these conclusions, the people for the first time had a chance to look at themselves and their everyday world from another perspective and realized that their world had very different properties. The ability to see the everyday reality from another perspective, as if looking at it through the "eyes of gods", is what today we call consciousness. This ability of reflection gave rise to new forms of behaviour: Executively controlled actions and morality. But most important, the invisible reality presented a new challenge to humans: In order to deal with this new reality, people had to convert it into something tangible, with which they could operate. This new challenge resulted in people inventing symbols –

tangible images, objects and actions that represented invisible images, objects and actions.

For a long time people handled the invisible reality by decorating bodies of the deceased, placing artefacts in their graves and telling stories about the spirits of deceased ancestors. At last, around 30 thousand years ago, the people developed a way to “see the invisible”, by drawing images on caves’ walls and crafting figurines out of wood, bone and stone. There emerged a symbolic way of representing the invisible and communicating with the invisible. Eventually, symbols started to be used for representing mundane objects, for instance, for memorising the number of killed animals or processed animal skins. Both magical reality and imagined everyday reality found their artificial embodiment in the language of signs and symbols. Around three thousand years BC Egyptians developed written language [53], and around two thousand years BC in Babylon and Egypt mathematics emerged [54]. Eventually symbolic consciousness gave birth to modern logical and scientific thinking.

But consciousness, having pushed humans beyond the boundaries of animal world, also brought with it psychological problems. The main of these problems was the necessity to maintain the border between ordinary and magical realities. To cope with this necessity, humans developed a special psychological mechanism - ERD. It took millennia for this energy consuming mechanism to reach the level of perfection that we enjoy today. In the ancient times, and even in the Middle Ages this mechanism frequently failed and the intruders from the realm of the divine disturbed people’s everyday life. People saw gods, mythical creatures, Christ and the Virgin Mary. Gradually, the work of ERD stabilised, became automatized and descended into the

subconscious. But even in a modern person ERD can fail in situations of stress, illness or danger, and when it fails it opens the door to monsters.

In 1948 American physicist of Russian extraction George Gamow and his colleagues predicted that the Big Bang must have left in the universe some relict background microwave radiation, which was indeed discovered in 1965 [55]. The emergence of consciousness in the Middle Palaeolithic too left a “relict background” in the minds of modern rational people – the belief in the supernatural. Psychological studies of the last decades of the XX century did indeed discover this implicit belief. Ousted into the realm of subconscious by science and religion, this relict belief in the world of the supernatural feeds magical thinking in modern people. By looking into the abyss of the supernatural, people have to, again and again, at every moment of life, generate the subconscious effort of distinguishing between the two realities and thus maintain the life of consciousness.

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Chapter 3. The Barrier for Robots: Subjective Experience as a Magical Phenomenon

Abstract

The chapter discusses problems that arise regarding the relationships between artificial intelligence and subjective experience. Could robots be created that possess a humanlike subjective experience? The analysis reveals that even if computer technologies in the future became incommensurably more powerful than technologies of today, we cannot expect that computers would have humanlike subjective experiences. The reason is that subjective experience is an exclusive property of living entities. Subjective experiences closely correlate with neural processes in the brain, yet these processes do not causally determine subjective experiences. The altered states of consciousness, such as hallucinations or virtual reality, are imitations of subjective experiences, but not authentic subjective experiences. As long as subjective experience cannot be causally deduced from more general premises, it meets the definition of a magical phenomenon. Neuroscience and cybernetics will be creating increasingly complex interfaces between intelligent machines and subjective reality of consciousness, but the gap between the AI and authentic subjective experiences will never be bridged.

Problem

Within yourself, keep life in hold:
Your soul is a whole world
Of thoughts of mystery and charm,

They will be sunk in daily hum,
And scattered by the sun's rays, rude:
Hark to their song, and just be mute.
Fedor Tyutchev (Translated by Yevgeny Bonver [1])

The 1999 film "The Matrix", written and directed by the Wachowskis, portrays a futuristic world, in which robots subdued the human population by turning people into the source of energy [2]. In order to secure that a human body, which lies in a capsule clad in a net of wires, worked faultlessly as a source of power the machines created simulated reality – The Matrix –, which the enslaved humans take for a real world. The film could be interpreted as a modernist version of the theory by Greek philosopher Plato (427 – 347 B.C.), which suggests that a real world is an illusion. According to Plato, a person is chained in a cave and can only see shadows of the "real things" thrown by the fire on the wall of the cave opposite him or her. These shadows people take for the real world.

And so, a prisoner of The Matrix, a computer programmer Neo, is immersed in the world of simulated subjective reality and takes this reality seriously. Only assistance from the real world made Neo learn the truth and see the real world. In the film the real world looks unappealing: Dead cities demolished by machines, poisoned ecology, the underground city-sanctuary in which people who had managed to escape from The Matrix found a shelter, and food that is devoid of colour, taste and aroma. A person who managed to move from the world of The Matrix into the real world faces a hard dilemma: to remain in this devastated and colourless world, or return into the more attractive and pleasurable world of illusions.

In the movie's plot, artistic fantasy is skilfully waved into the fabric of real problems of human existence, created by the advancing technology. Can robots simulate human subjective experience? Is it really the case that a person, who is plunged into the world of simulated subjective reality, is unable to tell this world from the real world? What is better: To enjoy life in the illusory world or to move into the true world in order to fight for happiness but live a life of hardships and deprivation?

These are the questions that are discussed in this chapter, in the context of recent psychological studies on magical thinking in modern people.

What colour is a magnet? Physical world and subjective experience

Blue sky sprinkled with patches of white clouds, a quiet splash of clear ocean waves licking the white sand of a tropical island, tender, as if cut out of yellowish marble, petals of a tea-rose, delicate taste and aroma of a cream cake – this is how the real world in its best appears to our senses. But those of us who studied physics and chemistry know that all of the aforementioned sensations are noting but illusions. In the real world there are no such things as "green" or "blue", "sweet" or "sour", "hard" or "soft" – there are only electromagnetic waves of certain wavelengths that enter our eyes, molecular structures of food that stimulate taste buds in our mouth, and electric impulses that material objects create in special receptors at the tips of our fingers. Reflected from magnolia leaves, electromagnetic waves get into colour receptors of our eyes and are transformed into neuronal impulses, which proceed further into our brain. Having passed our optic nerves, the impulses are sucked into the unimaginably complex network of neurons of our brain's visual cortex and - lo and behold - we see green colour!

This transformation of physical processes into subjective phenomena, or qualia, is a miracle indeed, which remains unexplained by science. What existed prior to that moment - light, reflected from magnolia leaves, electrical impulses in receptors of the eyes and neurons of the brain – all of these physical structures were connected one to the other by a causal chain, which can be traced down step by step. And suddenly this chain is broken and there appears something entirely different - the experience of greenness. Colours, tastes, odours, sensations of heavy and light, hard and soft, big and small, short and long, quick and slow – the whole world of subjective experiences is a magical phenomenon, if by magical phenomena we understand the events that cannot be causally deduced from other physical structures or explained by the laws of nature (see Tables 0.3 and 2.1). Like in The Matrix film, we are faced with the dilemma: Which of the two realities - the reality of subjective experiences or the reality of physical processes that underlie these subjective experiences - is a primary reality, and which is a secondary, simulated reality?

But before we go any further, we need to consider the difference between what subjective experience and physical reality in more detail. From the Introduction we know that the outer world can only reach our Self when dressed in subjective reality. But subjective reality is unstable and prone to variations. For instance, when we are close to a building, we see ourselves smaller that the building, but when we move further away, we can cover the whole building with our palm. So, is the building smaller then our body or bigger than our body? We know that in reality the building is bigger then us, but what does that exactly mean, “in reality”? There is another problem with subjective experience. We know that subjective experiences in different people are not exactly the same. For example, the table in our study looks average size for an adult who sits and writes on the table, but the same table looks huge for a

baby child who craws under it. When you and I look at the same building, we always see it slightly differently, depending on the angle of view, and sometimes the differences can be huge, for example when I am close to the building and you see the same building from a long distance at the same time. How come then that you and I agree that we are seeing the same object?

In order to overcome these problems, people invented measurement. Measurement works as follows. You and I agree on that this particular object, for example a wooden stick of the length of an arm, is a *measure*. Next, we put this stick to the building in a standard way from top to bottom and designate the buildings' height, say, as 300 sticks. Of course, to be able to do the measurement we need to know about numbers, and this was discusses in the previous chapter. Having accomplished the measurement, we created the simplest *rational construction* (from the Latin *ratio* – reasoning). From now on, from whatever distance you and me look at the building, we may *see* its height differently, but *know* that it is always the same – 300 sticks. As a result, we made our subjective experience more complex, by doubling it. Every object is now presented in our mind in *two different forms*: as a phenomenon and as a rational construction (see Fig 3.1).

Figure 3.1 about here

As a phenomenon the object varies in size, shape, whether it feels warm or cold, heavy or light, and so on, depending on circumstances; it also varies between subjective experiences of different individuals. But as a rational construction it stays

the same, for all people and in all circumstances. Science generated rational constructions for every aspect of objects: Size (dimensions), shape (geometrical shapes), structure (molecular composition), weight, temperature, quantities (numbers), space (physical space), time (physical time), and causality (physical causality). Usually, rational constructions exist in the form of numbers, formulas, equations, geometrical shapes and scientific theories. What is important to note here is that the relations between subjective phenomena and rational constructions is not causal, but correlational. The "real apple" we are seeing and eating is not produced by the apple's rational construction (our knowledge about the apple's shape, weight, size and molecular structure); rather, the real apple (the phenomenon) is caused by the thing-in-itself, via our eyes and brain, and *the rational construction are created by us, through operating with the phenomena, doing measurements and converting the results in mathematical notions*.

If we are not satisfied by just seeing the apple, but want to find out *how* we see the apple, we look further into the human eye, and see a *retinal projection* – the imprint, which the apple as a thing-in-itself makes on the bottom of our eye. This imprint doesn't look very much like the apple's image that we see: It is much smaller than the apple we see, two-dimensional and upside down (as in Figure 3.2).

Figure 3.2 about here

If we look still further, things go from bad to worse: The distorted copy of the original

apple, imprinted on our retina, is converted into strings of neuronal impulses that already have no a slightest resemblance to the apple we see, and these neuronal impulses disappear into the unimaginably complex labyrinth of our brain's cortex. And then this complex conglomerate of neural impulses magically turns into an image of the apple that we see, and we see this image located not inside our brain, but outside over there, where it really is. Even more wonderful is the fact that this *subjective (phenomenal) image has a certain stability, or constancy*; if we increased the distance of the apple from our eyes, say, from 1 meter to 3 meters, it's retinal projection of the bottom of the our eyes would diminish 3 times, but the size of the apple we see would stay almost the same. If we are looking at a round disc placed up front before our eyes, the disc's projection on the bottom of our eyes will be a small disc as well; but if we lean the disc 45 degrees, it's retinal projection will become an oval, but we will still be seeing a round shaped disc. This wonderful stability of the subjective image shows that subjective reality is a medium, through which we see things-in-themselves, and this medium has a certain viscosity, or resistance to changes, similar to the resistance we experience when we are moving our hands in water.

To summarize, the phenomenal subjective experience is a magical medium that *is given to us to perceive the world*, whereas rational constructions *are created by ourselves*, in order to make the world of subjective experiences more stable, organized and controllable. Now we can see more clearly that *subjective experience is not produced by brain structures*, because brain structures work through physical force, whereas subjective experience is not a physical event. However, subjective experience *closely correlates with the work of brain structures*. Still, the question remains open

which of the two types of reality – subjective experience or the brain – is the primary, and which is secondary.

It would be logical to assume that primary reality of the two aforementioned realities is the one that defines the other reality. Indeed, can we change colour of magnolia leaves or taste of a cream cake by just thinking hard about changing them? No, we can't. By contrast, we can easily accomplish the above changes by placing the magnolia leaf under a colour filter and by changing molecular composition of cream that covers the cake. Not only sensations, but also a lot more complex subjective structures, such as temperament and personality, can be affected by altering material structures. For instance, Huntington's disease causes dementia and the lack of coordination in people aged between 35 and 44 years; but it can also affect personality, causing manifestations of anxiety, depression, aggression, egocentrism, and worsen addictions, such as gambling, alcoholism and hyper sexuality. And all these disorders result from a mutational change of just a single gene among tens of thousands [3]. Invisible to the naked eye molecules of drugs, neuromodulators, hormones and viruses, when they enter the brain or body, can change animal and human behaviour. If a capsule of an antidepressant - the neurophysiologist Martha Farah asks, - can help us effortlessly overcome problems in the everyday life, then aren't personality and temperament nothing but the manifestations of the structure of our bodies? And if this is the case, then is there anything at all in a human being that is not the effect of the structure of our bodies? [4]

Indeed, taken on their own, magnetic and electric fields don't have colour, molecules and their combinations don't taste, genes have nothing in common with human personality, and chemical substances used in antidepressants have nothing to do with

our mood and behaviour. And yet manipulations with these structures (electromagnetic fields, molecules and genes) can change subjective experiences. It appears that the dilemma “What stands in the beginning: biological structures or subjective experience?” is decisively solved in favour of biological structures. But let’s not jump to conclusions.

First of all it turns out that biological structures are connected to subjective experiences in a very loose way, which allows a wide range of variations. To start with, it is well known that chemical substances affect different people differently. For instance, effects of antidepressants depend on the individual structure of gene 5-HTT, which is responsible for production and transfer of serotonin [5]. As for the link between our genes and our behaviour, this link is even more flexible. Cases like Huntington disease, when human behaviour can be affected by changes in a single gene, are rare exceptions. Most diseases depend on a combination of dozens or even hundreds of genes. Besides, the way a certain combination of genes affects human behaviour depends on a number of environmental factors. For example, scientists established hundreds of genes that are linked to schizophrenia, yet these genes’ role is mediated by environment; most often the unfavourable combination of genes results in schizophrenia in immigrants, especially in those whose culture and appearance differ most from those of indigenous population [6]. There are genes that predispose a person to depression, but whether these genes would or would not fire depends on the person’s life experience. If a person’s life experience is positive and a number of traumatic events are low, the person is unlikely to develop a depressive psychological condition, even if he or she has a genetic predisposition to depression [7].

Second, psychological experiments demonstrated that subjective experience could adapt to changes in mechanisms of perceptual organs and the brain. For example, wearing special goggles that reverse the retinal image on the bottom of the eye 180 degrees make participants first see the world “upside down”; but after a few days the normal phenomenal image of the world reinstates [8]. When an optical device is worn that inverts the visual field in depth, participants still see certain objects (e.g., a human face) undisturbed [9]. It is also known that people with a damaged brain could recover some of their psychological abilities through training – the phenomenon known as neuroplasticity [10]. If subjective experience were causally determined by the brain structures, all these phenomena could not exist.

It turns out that in order to write a computer program for even most elementary subjective experiences, such as the feeling of depression or perception of objects, one has to take into account the unique combination of genes and environment. We can imagine the vastness of the information about various combinations of genetic and environmental factors that robots in The Matrix needed in order to simulate full-scale subjective experiences of a person, with all of these experiences’ colours and sounds, tastes and odours, happiness and unhappiness, hopes and beliefs, love and hatred, sufferings and joy, communication and loneliness. The robots also had to simulate the person’s unique personality, temperament, memories of his or her past life, knowledge of languages, information the person has about his or her country and society, and literally all the bulk of knowledge that a modern educated person holds in his or her mind.

“And so what?” – a reader might ask. – “The robots of The Matrix have almost unlimited capabilities to create the unlimited number of combinations of genes and

environmental influences. If the robots were capable of taking the upper hand over their creators – humans, they would certainly be able to simulate full-scale human subjective experience". If the reader's argument is correct, then human subjective experience has nothing to do with magic. In this case, subjective experience is simply a product of a complex combination of genetic and environmental factors, in the same way as the "ability" of a spaceship to fly in space is a product of combination of the spaceship's parts. Indeed, none of the spaceship's parts, taken separately, can reach space, but all of the parts put together in the right combination can move astronauts into the orbit. So, let us consider the reader's question more closely.

Brain and thinking: A producer or a receiver?

There are two types of complex systems in a human organism: those, which produce, and those, which receive. For example, liver produces cholesterol, thyroid gland produces thyroxin. Liver and thyroid gland are biological plants responsible for production of hormones. By contrast, an eye receives light, and transforms electromagnetic rays into neuronal impulses that proceed into the brain through optical nerves. The question is to what of these two types does the brain belong in regard to subjective experiences? Is the brain a producer or a receiver of subjective phenomena?

As far as it concerns sensations and perceptions, the answer is clear: Because our perceptual organs (eyes, ears, taste buds) are tightly teamed with the brain, they can be viewed as parts of the brain, which are "brought forward" beyond the skull and towards external reality. In this regard the brain is a receiver of sensory stimulation. But how about thinking, personality and emotions? Presently many researchers share the view that thinking is the brain's function. For example, Francis Crick, one of the

scientists who discovered the structure of DNK, writes “"You," your joys and your sorrows, your memories and your ambitions, your sense of personal identity and free will, are in fact no more than the behaviour of a vast assembly of nerve cells and their associated molecules. As Lewis Carroll's Alice might have phrased: "You're nothing but a pack of neurons."” [11, p.3]. In this view, the brain produces thinking just like the liver produces cholesterol. But there is a different view on the relationships between thinking and the brain.

Neurophysiologist David Eagleman brings the following example. Imagine that you are a bushman in the Kalahari desert, who found a portable radio in a heap of sand. Trying various buttons, you suddenly hear human voices. You start to explore how these magical voices could possibly come out of the mysterious box. You open the box, manipulate various wires, and see some regularity to emerge. You discover that every time you break the contact between a green wire and a base, the voices disappear, but when you restore the contact, the voices are back. By manipulating other the wires, you learn how to increase of decrease volume, create and remove noises, and so on. In the end, you come to the conclusion that the voices are a product of the enigmatic box. You can even create a theory of how the wires in the box produce the voices. At that, you don’t know anything about electromagnetism, about a radio station that is located thousands miles away and is presently broadcasting the news or Mozart’s symphony into the ether [12]. By analogy, we can consider the relationships between the brain and complex forms of subjective experiences, such as thinking, emotions and free will.

What if the brain does not produce thinking or emotions, but receives these subjective experiences in the way the radio receives the symphony? In reality the “symphony of

subjective experiences" is being played and conducted by an entity that we cannot see, like we cannot see the radio waves. Without the radio we wouldn't hear the "music of subjective experiences", but the radio is a receiving organ, whereas an "orchestra" invisible to us generates subjective experiences. So, what is the brain: a producer or a receiver? If it is a producer, then subjective experience is a mirage, an illusion, which accompanies the work of the brain. And what if the brain is a receiver? When a certain part in the receiver fails and the receiver stops functioning, disappears the sound but not the music. The "music of subjective experience", which is unique to each individual human being, keeps playing in the magical ether of subjective reality, and can be accessed by you again once the "radio of the brain" is fixed. Perhaps, this music is what we call "the soul".

And now suppose that the "symphony of subjective experience", which the human brain receives, is produced by robots from The Matrix. Could the robots create the "symphony" so complex that a sleeping person would not be able to tell this symphony from real life?

Robots and the magic of subjective experience

Back in the 1950-th Canadian neurosurgeon Wilder Penfield was looking for the way of easing the fits of patients suffering from particularly hard cases of epilepsy. He used to opened the patient's temporal lobe of the brain and stimulate the cortex by low-voltage electric current [13]. Penfield registered a new phenomenon, which he named "double-consciousness". The patients, who were under local anaesthesia and in full consciousness, reported having two parallel but separate currents of subjective experience. One of the currents was artificially induced by the electric stimulation but seemed to the patient completely authentic, and the other was elicited by the stimuli

coming from the current environment in the operating theatre. At that, the patients could unmistakably tell the artificially induced subjective experience from the real one. For example, Penfield recorded an occasion in which "a young South African patient lying on the operating table exclaimed, when he realized what was happening, that it was astonishing to him to realize that he was laughing with his cousins on a farm in South Africa, while he was also fully conscious of being in the operating room in Montreal" [14, p.55]. Using results of his pioneering studies, Penfield developed the cortical "homunculus map", which showed cortical localisation of motor and sensory zones connected to the actions of limbs and other organs. One might assume that robots of The Matrix, having an immeasurably more perfect "homunculus map", were indeed able to create in people the full-scale illusion of real life. But there is a problem.

It wasn't difficult for Penfield to interpret his patients' reports of their subjective experiences, because he knew from his own subjective experience what subjective experience was. But did the robots of The Matrix know this? As we know, a person's subjective experience is strictly private; it cannot be directly shared with another person. One can share one's subjective experience only through verbal or nonverbal (i.e., through gestures or facial expressions) reports. But however hard one tries to put in words even the simplest sensation, one is unable to transfer the most important part of it – the authentic quality of this experience, or the "qualia". Trying to pass the authentic subjective experience through words is the same as trying to explain to a person who was born blind what blue colour is. So, for the robots of The Matrix to become puzzled by the problem of simulating human subjective experience, they had to have subjective experience of their own. To acquire subjective experience, the robots had to overcome a major barrier – the barrier that separates neural processes

(or any physical processes that go on in the robots' hardwire) and the "qualia" of subjective experience. But the robots cannot do this without overcoming still another barrier – the barrier that separates living entities from non-living things. In other words, to have subjective experience, the robots have to become living creatures.

Indeed, today we don't have any proof that a non-animate object, however complex, can feel a need of something, experience an emotion or produce an action of free will. Devices such as thermostat can imitate the actions of a living entity (e.g., as if the device "senses" the surrounding temperature and "desires" to keep the temperature at a certain level), but in reality such "behaviour" is programmed by people and only superficially resembles the behaviour of a sentient organism. Only a living entity, starting from a single cell organism, can behave on the basis of the *inner reflection of its own condition* – the reflection that we call subjective experience.

As for the mechanism of the emergence of life, it is an enigma for science. According to Oparin-Haldane hypothesis, life on Earth originated in the oxygen-poor primeval atmosphere, which resulted from volcanic activity. Under the impact of lightning and ultraviolet light organic molecules were synthesized; these molecules later changed into more complex molecules and finally into primitive colloid aggregates called "coacervates" [15]. In 1953 American scientists Stanley Miller and Harold Urey managed to synthesize in a glass flask simple amino acids, which are parts of protein molecules. They did this by firing continuous electrical sparks in the vapour containing water, methane, ammonia and hydrogen [16]. However, subsequent studies have shown that the primitive atmosphere on Earth contained a significant amount of oxygen, and this would impede the synthesis of amino acids. Besides, as American biochemist Jonathan Wells argues, even if scientists were able to create all of the

chemical compounds of a living cell, they would not be able to create the cell [17]. Indeed, a modern jet consists of millions of parts, which are put together in a most intelligent way, but this doesn't make the jet an entity that feels a need to fly. The emergence of life on Earth, and in the universe for that matter, remains a mystery.

To summarize, subjective experience in its simplest forms, as a feeling of hunger or thirst, can only appear in a living creature. A stone, a river, a planet, a computer – any non-living entity, however complex it might be, is indifferent to its condition. The river doesn't care whether it flows within its usual banks or flooded the surrounding fields. A meteor can fly in space for billions of years, without a slightest sense of loneliness or boredom. Only a living entity cares about anything. Only a person can ask the question of what caused the flood. Without living creatures there is no causality in the universe, and there is no the universe as we know it for that matter. The ability to have a wish or a drive, to experience joy or pain, to feel the need to explain things is impossible to find in non-living things. This miraculous ability – to be alive and to have subjective experience – is a supernatural ability, which is brought into the inanimate universe from elsewhere.

But when and how did subjective reality manage to "put a claw" into indifferent non-animate matter, to "subdue" this apathetic combination of atoms? When and how the non-living molecules suddenly started moving not by the order of physical laws, but by the order of the animated entity that existed outside these laws? Perhaps, like subjective experience, life is a magical event and appeared in the universe not because, but against the laws of nature. If so, then it is understandable that all of the scientists' efforts thus far to create, or even merely comprehend the origin of life

failed. Perhaps, death is a magical event as well. May be, when a person dies, he or she does not turn into a mixture of atoms and molecules dissipated in the vastness of the universe, but passes up to another level of existence, leaving his or her dead body behind?

We don't know the answers to these questions. Perhaps, we'll never know. But one thing is clear: Even the most advanced robots can only imitate living systems, though the imitations can be impressive. It is possible that robots can be programmed to repair themselves and even to create copies of themselves, thus imitating a self-replicating living sell. But they would only do this because they had been programmed. What the robots can't have in principle is subjective experience. But this means that the robots will never be able to simulate subjective experience in order to fool a person. Similarly, people too would be unable to simulate subjective experience of an alien creature living in conditions different from those we have on the Earth.

But let's ask the question: Suppose the robots of The Matrix were indeed able to simulate the full-scale human subjective experience, why would the robots need to do that? For what purpose would the robots spend so much effort on creating the Matrix when a person's body can be used as a source of energy without the person being in a conscious state of the mind? Indeed, a person who is in a comatose state can be alive for years, even dozens of years [18]. There could only be one reason for the robots: For their purposes they needed real living people and not just the people's animated bodies.

And this raises another question: Why do people need subjective experiences in the first place?

Who moves a finger? Free will as a magical action

With all the diversity of my subjective phenomena (sensations, perceptions, thinking, emotions, actions) the most quintessential phenomenon is my sense that all of these phenomena belong to me. But what am "I"? Of course, my name, gender, age, family status, nationality, race – all of this is me, but these are only external objective properties. My "I" also includes my temperament, my personality, my desires, my thoughts and my feelings – but even those properties are not the most essential ones. The most essential property of my "I" is my feeling of "authorship" or "agency" – the feeling that my actions and my thoughts are not imposed on me by someone else, but originate inside myself. The notion "I am an agent of my actions" means that I am a centre of creation, in which something very real (e.g., emotions, thoughts and actions) emerge from nothing but my Self. People know very well which of their thoughts and actions emerged from their own Self, and which they borrowed from someone else. Only those thoughts and actions that emerge from our Self is our real subjective "I". But as we know, emergence of something from nothing is a magical event, which violates the principle of physical causality and the law of energy conservation. In philosophy this magical property of the human mind is sometimes called "freedom of choice", and sometimes "free will".

"But behind every choice – a reader might say – stands a certain motive or a wish; for instance, when I choose cola instead of mineral water, I give up to my longing for a sweet drink. Certainly, one can't act against his or her drives and wishes". Yes one can, but we shouldn't conflate an action of *free choice* with an action of *free will.*

What is an action of free choice in a nutshell? An action of free choice is the ability to choose from a number of options. Usually this opportunity turns up when our options are arranged not in a hierarchical order (like a choice between life and death) but lay in the horizontal plain and allow us enough time to think and discuss "pros" and "cons". Having considered the options we finally make a decision: To buy this or another brand of shoes, to order fish or meat in a restaurant, or to go for this or another tour. Obviously, the action of free choice only seems to be free, but in reality is determined by our needs. Even so, determination of our actions by our needs is different from physical causal determination. Physical causality works through the known physical forces, such as gravity or electromagnetism. By contrast, determination by needs conforms to magical causation through participation (see Table 0.3 of the Introduction). I submit to my needs because I don't distinguish my needs from myself; my need for food or love is a part of me. Yet my needs are only a part of my conscious "I" and determine my actions only partially. The other part of my conscious "I" is my voluntary decision to accept the demands of my needs, with the right to "veto" these demands. Under normal circumstances of everyday life the right of veto is rarely used. But when a situation arises in which my private needs get in conflict with my moral consciousness, the action of free choice may grow into the action of free will.

So, what is the action of free will? The action of free will is the ability to choose an option, which stands at the bottom of the hierarchically arranged "survival scale" wired in us by evolution, e.g., to starve to dearth for the cherished idea or to be honest when there is an opportunity to lie and get rich without undesirable side effects. An action of free will works against the survival instinct; this action doesn't have a

motive except maintaining the awareness of being fair and right. The action of free will breaks the psychological causal chain “personal interest – wish – action”. But is the action of free will indeed independent from the brain-body mechanisms, or is it only an illusion?

Searching for an answer, American physiologist Libet made a series of experiments. In one of these experiments participants were asked to press a button by a finger, or simply to move a finger when they wish. On top of that the participants were instructed to remember a position of a running dot on a tableau of the device measuring time in milliseconds at the moment “when they only start feeling the wish to make the move”. It turned out that the awareness of the wish to make an action and the action are separated by the time period of approximately 200 milliseconds. This result wasn’t surprising. What was surprising however was that an electric potential in the motor cortex of the participants’ brain (called “readiness potential”) appeared 300 milliseconds prior to the awareness of the intention to make the movement. It looked as though the brain “made a decision” to make the movement prior to the moment when our conscious “I” made this decision [19]. If the action of free will is a conscious decision to make the action, then the freedom appears to be an illusion. It looks as though an action of free will is simply a delayed awareness of the decision, which had already been made by our brain [20]. But let’s look at this experiment more closely.

First of all, we notice that the participants’ actions in Libet’s experiment were not the actions of free will; the participant’s actions “to move a finger” were conditioned by their motive to follow the experimenter’s instruction. This motive in its own right was

conditioned by the participants' consent to participate in this experiment, which was also conditioned by some other motive (i.e., to get paid), etc. In other words, Libet studied not the action of free will, but the action of free choice between two options: To move or not to move the finger in this particular moment of time. As we know from our everyday experience, the action of free choice is not a momentary event but is stretched over time. Usually, when we have a range of options, we hesitate for some time before we make a decision, and when the decision if finally made, the awareness of this also comes gradually. For example, in the case of Libet's participants, they may have hesitated for some time on "Do I want to move my finger "now" or don't I?" Finally, when the decision comes "I certainly want to move my finger now", the participant registers the position of the dot, and after that moves the finger. So, the "readiness potential" of the participant's brain may have occurred not prior to the participants conscious decision, but prior to the participants' "final decision" to proceed with the action. In reality, the readiness potential might have accompanied the participants' period of hesitations, when the participants were aware that they want to make the action, yet were unsure they wanted to do it "now". The above considerations undermine the conclusion that Libet's experiment testifies to the "brain's priority" in the action of free choice. Even to a lesser extent Libet's experiment can be used to understand the action of free will. The action of free will occurs in situations of an existential choice, such as a choice of compassion versus egotism, honesty versus dishonesty, moral integrity versus corruption. Studying the action of free will requires a special type of psychological experiments [21][22][23]. These experiments showed that for both adults and children making the action of free will is hard but possible.

But suppose that the action of free will, and the whole consciousness for that matter, is indeed an illusion that reflects, with some delay, decisions made by the brain and the body. Let's investigate if the assumption "the brain is a decision maker" is free from a logical contradiction. Indeed, the question arises of why we have the feeling of agency if this feeling is nothing but a useless reflection of the "brain work". Would it not be more economical if a person acted like a zombie?

One answer to this question is that humans need consciousness for cognition and exploration of the world. Thus, David Eagleman writes "Consciousness is a long-term planner, the CEO of the company, while most of the day-to-day operations are run by all those parts of her brain to which she has no access" [12, p.70]. Indeed, any training, for example, learning sport skills or driving skills, starts with a conscious effort that eventually becomes automatized and in no need of conscious control. By analogy, an action of free choice is only needed in new and unexpected situations. For instance, when you are running down the stony hill you don't think about where to put your foot; your foot automatically finds the right position. But now you run into a crack in the ground that you can't jump over; immediately you consciousness is switched on and starts looking for the way around the obstacle. In other words, for solving complex cognitive problems we use our ability of free choice, whereas dealing with smaller and simpler problems we pass down to our brain.

The argument that for problem solving consciousness "comes first" and the brain "comes second" may sound somewhat unusual, because in the present time the notion that people think "with the brain" is so common that it almost became a habit. Yet Greek philosopher Aristotle, who lived in the IV century BC, was of the opinion that

thinking is the function of the heart, and the brain is a machine for cooling the blood [24]. Our knowledge about the brain, nervous system, neuronal chains, etc., which today looks unquestionable and even self-evident, at some earlier times was a subject for observation, analysis and conscious decision. In order to generate the idea that subjective experience is an illusion reflecting decisions made by the brain, people had to first use their subjective experience for creating theories about the brain. Clearly, the argument that the brain is a decision maker runs into a circle: To discover that the brain is a decision maker, which creates the illusion of subjective experience, we need a support of our subjective experience.

Primacy of subjective experience in relation to concepts of physics and physiology is also obvious from the fact that certain subjective phenomena don't cease to exist after their illusionary status is explained by science. For millennia people believed that the Sun revolves around the Earth, until Copernicus explained this illusion by the Earth's rotation around its axis. Nevertheless, the illusion is still there: In the everyday life, we speak of sunrises and sunsets. Explaining sensations of taste and odour by chemistry and physiology did not change the fact that salt is salty and sugar is sweet. To the luck of specialists on physiology of colour vision, their theoretical explanations of how colour vision works doesn't deprive them from the pleasure of enjoying the sensations of blue sky and green grass. By analogy, psychologists and philosophers who think that the sensation of the freedom of action is an illusion don't cease to feel themselves, and other people especially, responsible for their deeds. In other words, subjective experience is independent from a rational explanation of the physical mechanisms that underlie this experience. This means that *subjective*

experience must have special properties, which distinguish it from physical reality. Let's consider some of these properties.

Properties of subjective experience

The first and foremost property of subjective experience that distinguishes it from physical objects is that *it makes us human*. Any physical part of our body is a means to the end; we need our tongue for speaking, out heart for pumping the blood around our body, our legs for walking, etc. This does not apply to our subjective experience. It is not that a person needs subjective experience in order to accomplish something; a person is his or her subjective experience. Without a person's subjective experience there is no the person. And what is there? There is what we call "a body". But again, a body is a perceived phenomenon and a scientific concept; for both of these manifestations of the body we need subjective experience, either in the form of perception or in the form of thinking. From this it follows that *subjective experience is not an illusion; it is a magical phenomenon, which cannot be explained by logic and science, but which gave birth to logic and science.* Subjective experience is a gift to human beings, and to all living creatures for that matter. A person can accept this gift with gratitude, or refuse to accept it. Having accepted the gift, we can develop or spoil it, but we cannot create subjective experience.

"And what about the fact that, by stimulating parts of human cortex, it is possible to create the illusionary stream of consciousness, like aforementioned Penfield's experiments showed?" – a reader might ask. Yes, as argued in the beginning of this chapter, eliciting subjective phenomena is possible, but it will be eliciting, not creation. That is why a person, who experiences artificially elicited subjective

phenomena, can distinguish these phenomena from the parallel real ones, just like we distinguish dreams from reality or a fake from a real thing. But most important, artificially elicited subjective phenomena are as inaccessible for rational explanation as are the authentic subjective phenomena. We understand how the stimulation of the cortex by electric current is converted into the person's experience of "laughing with his cousins on a farm in South Africa" no more than we understand how light waves of a certain frequency are converted in the sensation of green colour. Phenomena such as the feeling of desire, free will, intentionality, voluntary action, creative insight, and other manifestations of subjective experience are inexplicable in terms of physical causality; they are magical phenomena of the "emergence/vanishing" type. These phenomena correlate with certain processes in the brain, and are distorted or vanish when the processes in the brain go wrong; but subjective phenomena cannot be deduced from the brain processes in causal or logical ways.

"Fine – the reader goes on – but what about *subconscious processes*? Isn't subconscious processes a part of subjective experience which is inaccessible to conscious awareness? And could we not deduce conscious subjective experiences from our subconscious processes?" Indeed, our subconscious memory, thinking and feelings that are parts of our subjective experience. Psychologists and philosophers often use subconscious subjective experience in order to "scientifically" explain phenomena that are not yet fully explained by science. Dreams, hypnotic states, hallucinations, telepathy, telekinesis, Freudian "complexes", Jungian "archetypes", and many others unexplained phenomena are relegated to the department of subconsciousness. "Explaining" unexplained phenomena by placing them into the subconsciousness sounds scientifically plausible and gives these phenomena a legal

status in the modern world. But what subconscious subjective experience really is nobody knows. Is subconscious subjective experience a source of conscious subjective experience, or is it a "wormhole" through which magical phenomena of subjective experience filter into our conscious mind? In any case, subconscious subjective experience is as mysterious and irreducible to the body or the brain functions as is conscious subjective experience. All we currently know about subconscious subjective experience is that it stores information, supports creative magical thinking and makes our body alive. Most of our body functions (e.g. blood circulation or food digestion) are controlled by subconscious processes. When, under general anaesthetics, we don't have conscious subjective experiences, all our body functions rely on subconscious processes. Similarly, a person in a vegetative state can be alive for years without conscious subjective experience. When we talk about subjective experiences in lower animals and even in single cell organisms, we too mean subconscious subjective processes.

To summarise, conscious subjective experience makes one a conscious agent, and subconscious subjective experience stores memories, does the creative job and makes the person's body alive, but neither of the two kinds of subjective experience are the products of the brain or the body. This distinguishes subjective experience from physical or biological phenomena, which always result from certain causally detectable processes. Knowledge of these causal processes allows us to manipulate physical and biological phenomena, for example, to transplant a kidney or a heart. But it is impossible to transplant subjective experience.

The second property of subjective experience, which distinguishes it from physical reality, is that a person's subjective experience *is not accessible for direct observation*

from the outside. Indeed, physical objects we first register in perception: this is a stone, this is a river, and this is a trace of an alpha particle. Having perceived the objects, we compare them one with the other, measure them and assess in figures. Having done the measurements, we create scientific concepts of physical objects and proceed with establishing causal connections between these concepts via four known physical forces: gravitation, weak and strong nuclear, and electromagnetism. By contrast, we cannot see what the other person is seeing or thinking, we can only infer the other person's subjective experiences from the person's behaviour. We know that every person has to believe in something, e.g., in god, science, or materialism. The person's beliefs reveal themselves through the person's verbal or nonverbal behaviours. By carefully observing and analysing these behaviours, one can study the person's beliefs and then use these beliefs as "carrot and stick" to influence the person. This means that it is possible to study subjective experiences by objective methods; it is also possible to influence people's subjective experiences, but not through tampering with their brains. A person's subjective experience can be influenced via manipulation with his or her beliefs, desires or perceptions. Religious leaders, politicians, psychotherapists, specialists on advertising, teachers and artists routinely influence people's subjective experiences without intervening into their brains. As far as it concerns interventions in the brain functioning, these interventions affect not subjective experiences as such, but the process of the brain's normal functioning. The work of a neurosurgeon can be paralleled to the work of a radio engineer who is fixing the radio. Without the normal functioning of its mechanisms the radio won't play music. But the engineer can't make the fully fixed radio play the music if there is no music in the ether for the radio to play.

The third property of subjective experience that makes subjective experience different from objects of physical reality is that, whereas a person's subjective experience is inaccessible for observation from the outside, *it can be accessed by the person "from inside"*. The fact that we have our subjective experiences inside our minds opens a unique opportunity to study these experiences in a different way from the way we study physical objects. Indeed, as mentioned above, the first step in studying physical objects is to register them in observation through perception. By contrast, our subjective experience can't be registered in our perception. We see a tree, but not our perception of the tree. We cannot perceive our thought, our voluntary decision, or our feeling of love, but we can register these subjective experiences through self-reflection, give them names and interpret them. In the realm of subjective experience a mental image of an object, a thought about the object and the object's name are connected via *participation*, or, to use a term from quantum physics, "entangled". For instance, the image, the thought and the name of a rose flower are not the same, but it is hard to separate one from the others: where there is the image, there is always the thought and the name, and vice versa. Moreover, one kind of thoughts and images can trigger another kind of thoughts and images by the same principle of participation. For example, while walking in a park we suddenly catch the aroma of a cherry tree blossom, and this olfactory sensation may trigger thoughts and memories about the events in our childhood, and travelling further along the associative chain bring us to the most unexpected thoughts and images. The study of subjective experiences "from inside" is most skilfully conducted not by scientists, but by writers; Marsel Proust's masterpiece "In Search of Lost Time" is one of the most known examples.

Finally, one can distinguish subjective experiences from physical objects by the way people exchange their subjective experiences with other people. Physical objects

interact via aforementioned four fundamental physical forces and the interaction conforms to the laws of physical causality and energy conservation. By contrast, *exchange between subjective experiences of two people conforms to the law of participation*. For instance, by saying our thoughts out loud we address a partner and tune the partner's subjective experience to similar thoughts and images. Suppose, a husband, when walking with his wife along the shore of the Red sea, says, " A beautiful sunset, isn't it darling?" and the wife answers, "Do you remember our trip to San Diego? There were sunsets like that there as well". Clearly, the exchange by communicative messages cannot be reduced to the exchange by light and sound waves that the speakers produce; the content of the communication follows the magical law of associative participation.

In contrast to associative thinking that conforms to the law of participation, scientific thinking follows the laws of logic, which are similar to causal laws of nature. Logical thinking links subjective experience to physical objects (see Tables 0.1 and 0.2). Logic and mathematics are parts of the external world on the mind, designed to create rational constructions and stabilise the diversity and flexibility of subjective experience. Robots are a product of logical and mathematical thinking, put into the body of complex machinery. This makes it impossible for the robots to go beyond the world of the laws of formal logic.

Altogether, the differences between subjective experiences and physical processes make it impossible for the robots of the Matrix to imitate subjective experiences. Nevertheless, there is a trend in popular culture to ascribe subjective experiences to robots. Let us consider this trend and some problems that anthropomorphisation of robots arise in connection with the topic of this chapter.

Humanization of robots

Speaking about robots, we sometimes use anthropomorphic expressions, such as «to teach a robot to do something», or «the robot can recognize human faces». Clearly, humanization of robots goes far beyond common anthropomorphic nature of human languages. For example, when we say «the sun is rising» or «the wind is blowing» we understand the metaphorical meaning of these expressions and do not believe for a second that the sun or the wind are animated entities capable of acting on their own will. However, when we speak about robots, we indeed mean that robots will be capable of putting goals for themselves, if not now then in the future, and consciously achieve those goals.

The phenomenon of humanization of robots looks even stranger in the light of the fact that nobody puts under doubt the obvious fact that a robot is nothing but a machine programmed by people. Everyone knows that even the most complex modern computer is a tool used for assisting human actions, and in this sense a robot is no different from any other tool, such as a hammer. It is unlikely that someone in the mass culture would suggest, “teaching a hammer to put nails into a wall”; rather, people would say, “teaching a person to hammer nails into a wall”. This raises the question: What is specific about robots that distinguishes them from a hammer and makes us apply to robots the terms that are usually applied to people?

Perhaps, we treat robots like humans because some of them look like humans? Many modern robots indeed are designed to look like people: They have a head, hands, legs and trunk. But let's imagine that somebody created a hammer looking like a person; would people apply terms of human psychology to this «humanlike hammer»? Obviously they wouldn't. Besides, not all robots have human appearance. For

example, complex computers, which could beat a world chess champion, don't look like humans, yet in mass media they are treated in the same way as the humanlike robots. The humanization of robots gave rise to the popular discussion on the limits of the AI development, and these limits begin going out of sight. In the movies «I robot», «Terminator» and «The Matrix» robots frequently outperformed humans in their ability to consciously think and act.

Of course, a typical robot today is a lot more complex than a hummer or even an automobile; it is a device full of electronics combined with sophisticated mechanics. Can it not be then that it is the complexity of the structure that makes a robot similar to people? Again, the answer has to be “no”. There are complex electro-mechanical systems that are not perceived as humanlike entities, for example modern jets. Flying machines, such as planes and drones, are constantly in the process of improvement, yet no one would say that a plane or a drone was «taught to perform new actions and skills». And vice versa, some robots with a simple internal structure (e.g., dolls that are used as sexual partners) can be treated as humans and even elicit in people the feeling of attachment.

So, if the features that make us perceive robots as humans are neither the robots' anthropomorphic appearance nor complexity of their internal structure, then what are those features? The most likely answer is that we view robots as independent subjects because of the functions that robots perform in our lives. Indeed, unlike simple tools and machines that amplify and improve our lower psychological functions (e.g., manual actions and movements in space), robots imitate and improve our higher psychological functions, such as thinking and memory. It is common knowledge that computers can do calculations a lot faster than humans, and can store vast amounts of information. Today computers started to imitate even human emotions and

communication. Some AI experts suggest that in the not so distant future robots will be able to perform the functions of human sexual partners and even become objects of love [25][26][27]. This will happen not only because robots will be increasingly looking like people, but mainly because they will become able to imitate human emotions and even human individuality and unpredictable behaviour. Even today within sex industry dolls are manufactured that can be used as sexual partners for people and elicit in people feelings of being in love [28].

Studies have shown that people are able to develop attachment toward robots. In one of these studies participants were given an opportunity to interact with a cute baby-robot that imitated a baby dinosaur. When subsequently the participants were encouraged to hit the toy, a significant number of participants reported having the feeling as if they had been offered to hit a living creature [29]. The results of such studies suggest that the phenomenon of humanization of robots can be viewed as a case of a more general phenomenon of animistic thinking.

People's tendency to animate their own creations is known from antiquity. Ever since people started to create symbolic images of gods and spirits, they began to invest these images with thoughts and feelings similar to those of their own, and perceive these images as if they were living creatures. The famous Greek myth tells a story of a sculpture Pygmalion who fell in love with a stature of a beautiful woman he had created. Aphrodite, the goddess of love, took a pity on Pygmalion and gave life to the statue, which became Pygmalion's wife [30]. In Ancient Rome people used to have in their private homes small images of domestic deities – lares and penates, and in public places they had statues of main gods and goddesses, such as Jupiter, Juno, and Minerva. Not surprisingly, monotheistic religions tried to uproot this tendency to animate images. The Bible says "You shall not make for yourself an idol, or any

likeness of what is in heaven above or on the earth beneath or in the water under the earth. You shall not worship them or serve them; for I, the LORD your God, am a jealous God…" (Exodus 20:4). Even more rigorous is Islam, which forbids creation of images of sentient beings.

However, people's tendency to attribute spiritual qualities to their own creations is imperishable; thus, in the everyday Christian religious practices today some icons are treated by believers as holy and having spiritual content in them. Humanization of robots can be viewed as a modern twist of animistic thinking. Being a high-tech version of Pygmalion's statue, a robot is even more likely to be attributed with human qualities due to the successes of prosthetics. While being still in its infancy, prosthetics nevertheless has achieved notable successes [31]. By reading intentional signals coming from their user's nervous and muscular system, biosensors relay this information to the controller (a device connecting the signals to the robotic limb), which then activates the artificial hand or leg. Some prostheses can be permanently attached to the body. In the future, prostheses could be created that assist not the limbs only but also other vital organs, such as heart, skin, and liver. Extending this line of thinking leads to the notion of *a cyborg* – a being with both organic and biomechatronic body parts [32]. The notion of a cyborg aligns with the notion of *a biorobot* – a robot that emulates or simulates a living biological organism [33]. A synthesis of a cyborg and a biorobot can lead to a notion of *an android* – a humanoid robot that looks and acts like a human [34].

But here a problem arises – to which extent can a living human person endure replacement of his or her organs with artificial ones before this "Terminator" stops being a living organism and becomes a proper robot? The answer to this question goes beyond technical capacities of bionics and enters the domain of metaphysics and

philosophy. Where is the subtle borderline or the proportion between living and non-living organs in an organism, crossing which would turn a cyborg that is still predominantly a human being, into an android, which is already predominantly a machine? Let us call this proportion *"the proportion of life".* The fundamental difference between a cyborg and an android is that the android lacks the most important property of any living creature – the ability to independently generate subjective experience in the form of goals.

At first glance, we can teach a robot to generate independent goals, by integrating into the machine a random numbers generator and a large number of possible strategies of action in a wide range of possible problems. Yet the difference between the goal setting processes of a robot and that of a living organism would still be crucial. The living organism sets goals for itself not by a random selection of suitable strategies from an available range of options; *the living organism creates its goals sensibly, on the basis of subjective experience*. As argued before in this chapter, subjective experience is a magical phenomenon and cannot be reduced to physical processes, such as the functioning of the brain or signals coming from the environment. Subjective experience is a unique feature of a living entity, which distinguishes a living creature from any, however complex, non-living structure, such as an android. The presence or absence of subjective experience sets the "proportion of life" and defines the limits of prosthetics.

So, how is it possible to determine the "proportion of life"? The "proportion of life" can hardly be established on the basis of pure theory, but it can be detected empirically, by replacing organs of a living organism by artificial organs. Perhaps, even not all human organs can be replaced by non-organic prostheses. For instance, it would be hardly possible to create a working prosthesis of a human brain. It is

possible to create a non-organic model of a neuron, which would imitate some of the neuron's functions. But the problem is that a neuron is not only a device for transmission of information throughout the body via electric and chemical signals; the neuron is also a living cell. It means that a neuron, in some elementary form, possesses the ability of having some kind of subconscious subjective experience, and subjective experience cannot be modelled on a non-organic structure.

Of course, there is a chance that artificial organs will be grown from organic tissues. But then a person who gets these organic "prostheses" will stay vulnerable to all the limitations of organic life, including wearing and death. In this "organic" version of prosthetics a person's life could be extended, but the person will never become a potentially immortal robot. Contrary to the ultimate expectations of trans humanism, and in spite of all the present and future successes of bionics, cybernetics and prosthetics, humans will remain humans – limited and mortal living beings, but the beings with a gift divine – consciousness and subjective experience.

The impossibility of the Matrix

Wachowskis' film appeared in the second half of the XX century, in the peak of "computer euphoria". Around a decade before the movie the idea had emerged that it was possible to simulate the entire universe by converting every atom in a series of ones and zeros. Because a person is a part of the universe, in this cosmic program every individual would occupy his or her humble place. "There is no way – American physicist Frank Tipler writes - for the people inside this simulated universe to tell that they are merely simulated, that they are only a sequence of numbers being tossed around inside a computer and are not in fact real [35, p.181].

How do we know that we are real and not a simulation in some gigantic computer – Tipler asks? And answers: we don't, but it doesn't matter. Likewise, it doesn't matter whether the universe is real or merely a simulation. All that matters is whether it is possible to create an abstract program that is capable of simulating the whole universe. There is a concept "data compression" in algorithmic information theory [36]. According to this concept, creating a computer program makes sense only if the program is shorter than a simple description in digital code of the process that this program codes. Accordingly, Tipler's question might be reworded as follows: Could an algorithmic program code the whole universe, and if it could, then would this program be shorter than the description of the universe in digital code?

But algorithmic programs are created by people, and are a piece of knowledge. This fact brings us back to the problem of the relationships between knowledge and subjective experience. What was in the beginning: Knowledge about the structure of universe, or subjective experience through which this universe is observed? If we accept the view that knowledge is a model of perceived phenomena and their interactions, then we first have to be able to perceive the phenomena, before we could convert these phenomena in the invisible reality of signs, numbers and computer programs (see Figure 3.1). It becomes clear that the computer programs of the universe could only be developed by an active agent who has subjective experience and is aware of his or her own existence.

So, who could be the programmer of the universe? That any intelligent life in the universe could not be such a programmer is explained by Gödel's theorem. Simply put, according to Gödel's theorem of incompleteness "Anything you can draw a circle around cannot explain itself without referring to something outside the circle –

something you have to assume but cannot prove." [37]. For instance, it is impossible to decide whether the statement "this sentence is false" is true or false while remaining within the rules of formal logic at the same time. The same applies to the universe. Gödel's theorem proves that it is impossible to simulate the universe from inside the universe. But is it possible to do from the outside?

If the programmer is a living agent with subjective experience infinitely more powerful than human subjective experience, then the answer could be "yes". The Bible is written exactly about such a "programmer". But if the programmers were the Matrix robots, the answer has to be "no". Being non-living creatures, the robots could not possibly know what subjective experience is.

Not everyone will be persuaded by this argument. American physicist Michio Kaku writes about the possibility in the future to separate human consciousness from a human body and feed it into a computer [38]. But before speaking about the future, it is useful to look back at the past. And looking at the past we see that the first "model" of our visible world was the invisible world of spirits (see Chapters 1 and 2). Computers could not invent the world of spirits because, being non-living things, they are immortal. Only living mortals who dream of the afterlife might need to create the world of spirits and benefit from their creation. It means that consciousness could only emerge in living entities. But this puts a fundamental limitation to the potential capacities of computer technologies. With all the computing power of robots, one can't expect that they would ever be able to simulate subjective experience.

Having said this, I didn't mean to diminish achievements of modern computer technologies in the domain of brain-computer interface. These achievements are fascinating. A functional magnetic resonance imaging (fMRi) can approximate which

areas of the brain are involved in solving certain tasks. By scanning electric potentials of the brain it is possible to teach a disabled person to “mentally” control a wheelchair or a computer cursor. It is possible that in the future advanced methods of analysis of brain’s electric potentials might establish correlations between patterns of brain’s electric activity and subjective images we see in our dreams. But all these achievements won’t change the fact that subjective experience and electrical signals of the brain exist in different realms. There will ever be a “neutral strip” of the unknown between subjective experience and computer simulated virtual reality. Rewording a known paradox, one might say that if human subjective experience were so simple that computers could simulate it, humans would not be so clever to be able to create the computers.

Conclusion

We started this chapter by asking the questions: Can robots simulate human subjective reality? Is it really the case that a person, who was plunged into the world of simulated subjective experience, would be unable to tell this world from the real world? What is better: Enjoying life in the illusory world or struggling for happiness in the true world full of hardships and austerities?

Our analysis discovered that subjective experience is a magical phenomenon of the “emergence/vanishing” type. In the realm of subjective experience, the laws of magic hold sway. Subjective experience was a basis from which modern science and logical thinking grew; an implication of this fact is that subjective experience cannot be explained in terms of physical causality or formal logic. Subjective experiences can be studied, both objectively and “from the inside”, but studying subjective experiences require special methods different from the methods used in physics and

physiology. Robots of The Matrix, created by humans on the basis of formal logic, could not be able to simulate subjective experience. The barrier that prevents robots from doing this is the necessity to be alive. Unlike robots, neuroscientists under certain conditions can elicit simulated subjective experience by tampering with the person's brain, but the person detects the difference between his or her authentic subjective experience and the simulated one.

What do we need to know this for? For not wasting our time and effort on chasing unattainable goals. Also, for not confusing studies of human subjective experiences with studies of inanimate objects in natural sciences. Or perhaps, for a better realisation of how unique and irreplicable life and human beings are in this universe. Finally, for the understanding that the explanatory power of physical sciences, though enormous, still has its limits. However far down the brain, inside the elementary particles of matter or in the depths of the universe science will go, it will not be able to escape the magic of subjective experience.

As for the question of whether it is better to enjoy life in the illusory world of simulated subjective reality (if some genius would ever be able to simulate such a world) or live a difficult life in the real world, I agree with The Matrix creators: This is a matter of personal preference.

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Part II

The supernatural in science and religion

Chapter 4. Miracles in Law: Magical Underpinning of Physical Universe

Abstract

The chapter analyses a psychological phenomenon indicating that certain kinds of magical causality, such as “participation” and “Self over matter”, leaked into the concepts of modern physics and cosmology. Recent psychological experiments have shown that modern rational adults subconsciously believe in the supernatural. At the same time, philosophical and psychological studies revealed that there exists a deeply rooted link between magical and scientific types of thinking. Magical thinking operates at the level of the subconscious through symbolic images, where it generates draft “theories in the making”; scientific thinking filters these draft theories and selects those, which are in concord with “objective reality”. Criteria used for this selection are empirical verification via experiments and compliance of a theory with the general context of available knowledge. As physical science stepped over from the observable world into the micro- and mega-worlds, empirical verification of certain theoretical ideas through experiments became impossible. The remaining criterion - compliance with the general context of knowledge - is a lot “softer” than empirical verification. As a result of this “softening” of the borderline between magical and scientific thinking the subconscious belief of modern people in the supernatural

filtered through into the very heart of physics – its theories about the origin and structure of the universe.

Problem

The only way of discovering the limits of the possible is to venture a little way past them into the impossible.

Arthur C. Clarke. “Profiles of the future” [1, p.21]

Recalling my school lessons on physics, I see in my mind’s eye the pictures of my school's physical laboratory, an induction coil, a device for demonstration of electric discharge, and a small cloud chamber in which alpha particles, like the jets in the blue sky, are leaving thin traces of steam. The names of Michael Faraday, Thomas Edison, Ernest Rutherford and other great scientists, who gave the world its modern physics, cross my mind. With all the diversity of trends in physics, physicists of the past were united in one thing: They knew how to ask nature questions and get the answers. Theories they created were sometimes questionable, but a life saving experiment always came to an aid. The experiment was a convincing judge: One can’t argue with facts.

I did not become a physicist. However, I have been maintaining my interest in physics trying to make up for insufficiency of knowledge by reading books. Simultaneously, in the course of my career as an experimental psychologist, I developed an interest in magical thinking in modern people. To my surprise, from a certain moment I started to be aware of the fact that some theories in books on physics for a general reader

were increasingly overlapping with magical phenomena. In the beginning I explained this fact by inaccurate interpretation of new physical theories in the books written by science writers and journalists. But when established physicists started writing books for non-specialists, yet the overlapping between physics and magic didn't disappear, my suspicion that magical phenomena crept into modern physics grew stronger.

Of course, physicists will be quick to object and say that magic is a direct opposite to physical theories. Why? Because physical theories are based on facts that can be verified by experiments, and magic (e.g., astrology of palm reading) is based not on verified facts but on false beliefs. It is true that the laws of classical physics are immune to magical spells. Yet, in the domain of human consciousness and thinking magical effects are real [2]. One important function of experiments in science is exactly to prevent magical phenomena, which happen in thinking or in the imagination, from invading scientific knowledge. But recently there appeared theories in physics, which are impossible to verify by experiments. One might ask: Is it possible that, with experiments inconceivable, there emerged a "psychological wormhole" through which magical phenomena can trickle into physical knowledge? In this chapter we will examine this possibility, in the context of recent psychological studies on magical thinking and magical beliefs in modern people.

Magical thinking and the magical world

My interest in magical thinking emerged over 30 years ago, while I was observing children playing games of pretend. The feature that surprised me was how easy it was for a 5-year-old "player" to overcome the most insurmountable obstacles and solve most difficult problems. "A tiger is chasing you, what are you going to do?" - I ask a

child, and the child answers, “I'll run away from it”. “And if there is a precipice in front of you?” “I'll jump over”. “And if the precipice is very wide?” “I will make a bridge and run over”. In play a child can pretend to be a bird, fly to another planet, read the mind of a wizard, erect or demolish a castle with the help of a magic wand. In other words, in play the child “thinks magically”. As stated in Chapter 1, magical thinking follows the laws of magic and embraces phenomena, which do not conform to the laws of logic and science.

Indeed, when we do mathematical calculations or create a computer program, we rely on rational thinking. Rational thinking follows the laws of formal logic, where consequences follow from premises and the law of contradiction is observed. Thoughts are divided into steps, and each step follows from the previous one on the basis of a set of strict rules. In contrast, when we think magically, consequences don’t need any premises, and two different objects or thoughts can merge into one. In magical thinking, thoughts follow each other not in a logical sequence, but by associations. Images of objects can appear from nothing; this could be images of ordinary objects, but also bizarre combinations of known objects (e.g., a winged horse, a mermaid, a centaur) or objects we have never seen before (e.g., some objects portrayed in surrealist paintings). Magical objects can have unusual properties: Demons, which sort out fast molecules from slow ones; animals, which can speak human languages; gods and spirits, which can read human minds and be in several places simultaneously.

But isn't yesterday's magic today's science? As British science fiction writer Arthur Clark said, “Any sufficiently advanced technology is indistinguishable from magic” [1, p.36]. Indeed, just three hundred years ago such events as instant transfer of a visual image over long distances and flying in the sky were viewed as magical events,

but today they are technological facts. Some scientists forecast that in the future even more advanced “magical” devices would arrive, which allow time travel and teleportation [3].

The parallel between magic and advanced technology is tempting, yet it is not entirely accurate. There are important differences between a magical action and a function of an advanced technical device. In the world of classical physics everything – from an atom to a human being – is a complex mechanism. The objects that classical physics study are soulless and mindless machines. By contrast, in the world of magic all objects are animated; in this world there is no difference between living and non-living things, there are no dead objects; every object, every entity has a soul and a mind of its own. Every entity can be spoken with – all you need is to know the language. As argued in the Introduction, there is a crucial difference between magical communication and physical interaction – the same difference that distinguishes an invitation to sit down from making one sit down by brute force. Physical interaction is based on one of the four known fundamental forces – gravitational, electromagnetic, strong nuclear and weak nuclear [4], whereas magical communication, just like social communication, is based on semantics (see Table 0.3 of the Introduction). For instance when we ask a person at a table to pass a saltcellar, we initiate the person’s action, which cannot be reduced to physical energy that we spend on speaking the words. This difference between magical and physical types of interactions results in the fact that in the magical world the laws nature, which govern the world of technology, are invalid.

The laws of science and the laws of magic

One fundamental law of nature is *the law of identity*. According to this law, two objects or events are independent from each other, unless a chain of physical causes continuously connects the objects. By this law, each object conserves its identity and is not influenced by other objects in the universe in other way except through the aforementioned four fundamental physical forces. In contrast, in the magical world two different objects can have connection one with the other that cannot be causally explained. For example, targeting the body of Koschei (a character of Slavic folklore) cannot kill him. His soul is hidden inside a needle, which is in an egg, which is in a duck, which is in a hare, and so on. To kill Koschei, the hero must find and break the needle.

Linked to the law of identity is *the law of permanence*. This law requires that a complex object maintains its identity throughout a certain period of time and cannot instantly turn into another complex object. This law is challenged in the magical world, in which transmutation of one complex object into another (e.g., a person into an animal and vice versa) could happen.

Another law of nature is the *law of conservation*. According to this law, the amounts of energy, matter or momentum in the universe remain the same, whatever transformations could happen to separate objects. Unlike in the world of nature, in the magical world *things can appear from nothing or vanish without a trace* ("emergence/vanishing" magical phenomenon). A ghost or a genie can suddenly materialize in front of a person, a cat can vanish into nothing with the last thing visible being its grin; UFO's, Sasquatch, Loch Ness monster and other enigmatic uncatchable entities can emerge from nowhere and be gone in unknown directions.

Finally, one more law crucial for science is *the law of independence*: The objects and processes of nature are independent from human thinking. For instance, the trees that obstruct our view of the ocean remain there however hard we wish them to go, and the law of gravitation doesn't care whether we like it not. Similarly, a person can't access another person's mind, except via communication through physical mediums (air or electromagnetic field). This fundamental assumption underlies the principle of objectivity of scientific research. In research, experimental facts are independent from how we want them to be; experiments' results define the explanations, and not the other way around. In contrast, in the magical world mind can change matter (direct Self over matter magic) or another mind (direct Self over mind magic), without connecting to the matter or the mind via the existing physical forces. It is easy to see the difference between magical "direct Self over matter/mind" actions and actions of modern devices that react to electromagnetic waves of the brain (e.g., motor prosthetics or brain-computer interface [5]). The principle on which neuroprosthetics are based looks magical but this resemblance is only superficial. Neuroprosthetics do not decode the meaning of a thought but react to the neuronal signals that accompany the thought, thus converting these signals into a movement (e.g., switching on the motor of an artificial limb or shifting a cursor on a computer screen). In essence, neuroprosthetics is a highly advanced and sophisticated version of a remote control. On a remote control we press buttons by a finger, whereas on a neuroprosthetic device a disabled person "presses the buttons" by intentionally producing appropriate neuronal impulses. This kind of interaction is still physical, not semantic: The device blindly reacts to the physical force – electromagnetic waves produced by a neuronal signal, which correlates with the thought or the wish (see Chapter 3 for more on this). By contrast, at a receiving end of a magical incantation or a prayer there is another

mind – a spirit inside the physical object, the mind of another person or the mind of god, which considers the plea and makes a decision about whether to grant or reject it.

Let us make a brief summary of the relations between the laws and phenomena of magic, and the laws of science. As argued in the Introduction, magical thinking follows *the law sympathy*, according to which two objects that resemble one another (e.g., a person and his or her photograph) are connected and share common fate: If the person's photo is hurt, the person will suffer as well, even if the person is on a different part of the globe. Another law of magic is *the law of contagion*: Objects that once were one (e.g., a person and the bunch of the person's hair), maintain their link forever; if anything happens to one of the objects (e.g. the bunch of hair is burned), then the same thing will happen to the other (e.g., the person will get ill).

Along with the *laws of magical thinking*, which are similar to the laws of nature in that they work universally and continuously, there are also *magical phenomena* – the events that violate the laws of science yet cannot be deduced from the laws of magic either. Magical phenomena don't have the universal status of laws. *Whereas the laws of magical thinking are confined to the domain of thinking and imagination, some magical phenomena could occasionally occur in the real physical world.*

One of these phenomena is *participation*, according to which two objects, which are entirely different one from the other, don't resemble each other and have never been in contact could, nevertheless, share a common essence or soul. French anthropologist Lévy-Bruhl illustrated the phenomenon of participation with the example of Bororo tribe of Central Brazil, who mystically identified themselves with parrots Arara, which they viewed as their totem. It was not that Bororo did not see a difference between a person's physical appearance and that of a parrot; yet, with all the physical

differences between a parrot and a person Bororo maintained that a spirit of Arara lives in a person, and so in each Bororo there is a part of Arara, and vice versa [6]. The second magical phenomenon is *emergence/vanishing*: things can emerge from nothing and can vanish into nothing. Manifestations of this phenomenon are random events, as well as creative thinking. In the magical world, nothingness is not a sheer absence of something, but is a productive "black hole", which can generate random events and creative ideas; it can also engulf events, objects and ideas, which then disappear without a trace. The third magical phenomenon is direct *"Self over matter/mind"*: Self (mind) directly affects physical objects and processes or another person's mind. For example, god creates the world, a prayer to gods helps at hunting or growing crops, a person's effort of will affects the work of a physical device. The difference between direct *Self over matter/mind* and *emergence/vanishing* magical phenomena is in that direct Self over matter/mind involves an active agent, whereas emergence/vanishing doesn't. Finally, the fourth magical phenomenon is *transmutation* – a sudden change of one complex object into a different complex object (e.g., a person changes into an animal, and vice versa).

The laws of magical thinking, magical phenomena and the laws of science are brought together in Table 4.1.

Table 4.1 about here

Because the laws of magical thinking existed long before science, these laws could not develop by negation of the laws of nature; rather, science built its laws by

rejecting the laws of magical thinking and prohibiting magical phenomena. Nevertheless, the world of nature is not separated from the world of magic by an impregnable wall. As we will see in this and subsequent chapters, *certain magical phenomena (such as participation and direct Self over matter) can be observed in the real physical world.*

Similarly, the imaginary magical world is not isolated from the natural world, but is a mixture of ordinary and magical things and events. For example, in Alexander Pushkin's fairy tale "Ruslan and Lyudmila" [7] Chernomor the Wizard in some ways is an ordinary person: he walks in his garden, falls in love with beautiful girls and even suffers from a sexual dysfunction. However, he also has a magical beard, which allows him to fly in the air and do miracles. An equally odd combination of the ordinary and the magical, the possible and the impossible we see in the myths of almost every nation. Because these "games with magic" are confined to the realm of our fantasy, they peacefully coexist with our belief in science. In fact, most educated adults in industrial cultures today, while enjoying magical thinking, are convinced that they don't believe in magic.

However, psychological studies of the last decades revealed that despite their conscious disbelief in magic, in their subconscious educated adults keep believing in the supernatural. In one of these studies British university graduates and undergraduates were shown an apparently "magical" effect—a square, plastic card became badly damaged in an empty box after a magic spell was cast on the box [8]. The participants were then tested in (a) the low-risk condition, where their driver's licenses were at risk of destruction by a magic spell or (b) the high-risk condition, where the participants' own hands were the objects at risk of being damaged as a result of the magic spell. The results showed that, in the low-risk condition, only 12%

of participants prohibited the magical spell; however, in the high-risk condition, 50% of participants asked the experimenter not to repeat his spell and justified their decision by admitting that the magic spell might indeed damage their hands. Other studies too indicated that, in certain circumstances, modern educated adults exhibit their believe in magic, both in their intuitive reactions [9] and conscious behaviour [10].

But if educated adults, when placed in a certain context, are prepared to accept that physical objects succumb to the laws of magic in a laboratory setting, what can prevent the people from believing that certain magical phenomena could occur in nature as well? Is it possible that even scientists – the creators of theories in physics – could admit magical phenomena into the world of nature, especially if mathematical calculations bring them to the conclusion that magical events are real? After all, physicists are people. Like all people, they are locked in the shell of consciousness, and have to conform to all the magical phenomena that consciousness entails.

Science or quasi-religion?

Physical science, due to its technical achievements, won such a great respect of the modern society that for a layman the physicists' statements became almost sacred. For scientists who are not physicists, the trust to modern physics is based on the respect toward precise and elaborated experimental procedures, which provide empirical support for physical theories. But what about the latest physical theories that cannot be tested by experiments? In what way are these theories different from the stories of the origin of man and nature that are told in the Bible? These theories are based on mathematical equations and post-hoc evidence, but mathematics is a science about numbers, not about the origin of nature, and post-hoc evidence (e.g., the expansion of the universe) is based on interpretations rather then on empirical testing.

For the first time this question crossed my mind when many years ago I began reading books about relativity theory. As it is well known, Einstein's special relativity theory is based on Galileo's principle of relativity, which states that the laws of physics are identical in systems moving in a straight line, one at a constant velocity in relation to the other, so that one cannot conduct any physical experiment capable of indicating if the body is immobile or in motion. Systems that move in a straight line with constant speed relative to each other are called inertial frames of reference, or "inertial frames" for short. Galileo invented transformations, which can help compare two inertial frames. Einstein applied Galileo's principle to the laws of optics and electrodynamics, and drew a conclusion that the absolute reference frame doesn't exist [11].

The question I was pondering was how the concept of physical inertial frames of reference related to the imaginary frame of reference that exists in the head of a theorist. Indeed, suppose I am thinking on the popular problem of whether a certain event (e.g., the lightning) occurs simultaneously or at different times in two different reference frames (e.g., a train station and a train that is passing by). Independently of whether I am staying on the railway platform and thinking about the train that is passing by, or sitting in the moving train and thinking about the platform, I am having both of these frames of reference in my head. It turns out that the statement on the equivalence of the laws of nature in inertial frames only makes sense if I tacitly allow for the existence of my own "personal" frame of reference, from which I can compare the two inertial frames and make the inference about the impossibility to distinguish between them by any physical experiment. Embedded within his or her "personal" reference frame, an observer can theorise about "jumping" from the platform into the train and back and conclude that the laws of nature in both are identical. What one can't do, however, is to jump out of one's own mind and ponder laws of nature while

being “outside” oneself at the same time. Subjective experience is the absolute frame of reference, which is always with us (see Chapter 3). *Interestingly, physicists tend to ignore this psychological frame of reference, as though it doesn’t exist.*

Reading various books and roaming the Internet for an answer I discovered that, criticising relativity theory is considered a bad taste, similar to trying to invent a perpetual mobile. Most criticism that exists is anonymous [12][13]. The impression is that the theory of relativity became a kind of “quasi-religion” of modern physical science, like Marxism was in the former Soviet Union. Of course, calling Einstein's theory “quasi-religion” is only a metaphor. However, regarding certain modern physical theories this metaphor is close to the truth. Indeed, today many scientists started to contemplate theories, which are impossible to verify empirically: The “string theory”, “M-theory”, and “theory of a multiverse” are only a few among this class of theories [14][15]. On the base of these theories, it is hard to expect new experimental discoveries any time soon. Of course, rumour has it that once the renowned British physicist lord Kelvin already assumed that there was nothing left to discover in physics, after which a flood of major discoveries followed [16]. And yet, it seems that Kelvin, if he said that, was not entirely wrong. Physics' explanatory power, like that of any scientific discipline, will inevitably come to its limits.

It is possible that in certain areas physics has already met its limits to explain reality. There is also the opinion that physics and some other sciences became victims of their own success. The higher the tempo of discoveries in science, the sooner the science runs into a certain insurmountable explanatory boundary [17]. Physics can never give ultimate answers to the questions of what physical reality is “really like”, how the universe emerged, what the fate of the universe is beyond a few billion years, why the fundamental physical constants (e.g., the speed of light, the gravitational constant, the

Plank constant) are so finely tuned to each other that they make life and a human being possible, what the role of a human being in the universe is, and many others. It is unlikely that biological science will ever be able to create living things from non-living ones, or even completely understand the mechanism of how an individual organism is built. We cannot expect psychology to fully explain consciousness, or cybernetics to prove that machines are capable of conscious thinking.

When physics as an empirical science comes to a threshold beyond which facts have to give place to beliefs, the belief in magic, which thus far have been lurking in the physicists' subconscious, can trickle into physical theories. And the situation appears when it is hard to understand, which of the theoretical constructions is still science, and which is already magic.

So, what makes this mind-boggling interaction between theoretical constructs of modern physics and magical phenomena possible? It appears that the causes of this convergence are hidden in the structure of human thinking, and in the subconscious belief of modern people in the supernatural.

Magic as a "midwife" of physics

The history of science suggests that magical thinking and scientific thinking are not incompatible intellectual processes but instead team up in a search for truth. As some authors pointed out, science grew out of magic: astrology gave rise to astronomy, alchemy gave birth to chemistry, and modern mathematics originated from numerology [18]. Another branch of culture that grew out of magic was modern religion. In prehistoric times magic and religion were the same. Finally, human language and poetry emerged form magic as well. The first word was a magic spell, the first sign was a magical symbol, and the first poetry was a way of speaking with

gods. This is particularly evident when one looks at the Palaeolithic cave paintings, Egyptian hieroglyphs and Greek mythology [19]. Religion and science grew out of magic by negating it, and language and poetry – by taking from magic and reworking magical rituals into symbols and metaphors. That could be a reason why religion and science are hostile toward magic, whereas human language and poetry openly acknowledge their kinship with the supernatural. As stated in the Introduction, communication through language is based not on physical causality, but on the magical one. In essence, a magical ritual is the forerunner of the whole of culture [20][21]. However, different branches of culture separated from magic at different times.

Unlike religion, which was fighting with magic since biblical times, in the age of Isaac Newton (1642-1727) physical science was not yet in opposition to magic but peacefully coexisted with it. In the XVII century physical science was an occupation of a few, and limits of science were more visible than they are today. Science did not aspire to understand the human mind, which remained in the department of religion. Newton was not just a mathematician and a physicist, but also an alchemist, who was trying to find the “philosophy stone” that could help transmutate common metals into gold. According to the Alexandrian cultural tradition (II-IV centuries AD), there was a magical kinship (sympathy) between certain metals and seven planets of classical astrology. Sun was “the ruler” of gold, Moon – of silver, Venus – of copper, Mars – of iron, Jupiter – of tin, Mercury – of mercury, and Saturn – of led [22]. In Newton's time, an impermeable barrier did not yet separated astronomy and mathematics from astrology and alchemy. Indeed, half a century before Newton took a post in Trinity College of Cambridge University, a member of this college's council was John Dee (1527 -1609) – a famous mathematician, astronomer, alchemist and astrologist. John

Dee's contemporary Italian Dominican friar and philosopher Giordano Bruno (1548-1600) was not only a mathematician and an advocate for Copernicus' heliocentric system, but also studied magic and astrology.

Giordano Bruno defined magic as “knowledge of the science of nature” [23]. Conflating science and magic was not unusual in the time of Renaissance, because both magic and science were seeking an answer to the same question of how to gain control over the universe. In the time when religion has long been persecuting magic (one of the accusations of the Holy Inquisition against Giordano Bruno was that he had been involved with magic), science still did not cut the “umbilical cord” that connected it to magical thinking. Perhaps, it was the magical kinship between planets and also between planets and metals that brought Newton to the idea of gravitation – the enigmatic invisible force that works instantly and at a distance. Gravitational force seemed to Newton as incomprehensible as the astrology's “force of sympathy”, which connected planets between themselves and with people. Only in the beginning of the XX century Einstein, in his general relativity theory, managed to explain gravitation through curvature of space. So it appears that the belief in magic opened the gate to classical physics.

The question arises of why physical scientists, as outstanding as Isaac Newton, did not see a contradiction in studying magic and physics simultaneously? Was it because magical and scientific thinking are not competing one with the other, but cooperate in a search for the truth?

The image of “a rider and a horse”: Scientific thinking as “taming the magical”

Sigmund Freud used the image “a rider and a horse” for describing the relationships between the conscious “I” - the holder of will and rational thinking, and the

subconscious “Id” - the holder of drives and passions [24]. The same image comes to mind when we think about the relationships between magical thinking and scientific thinking. According to psychoanalysis, the subconscious is not only a source of drives, but also of creativity. *Because in the realm of subconscious thinking is not strictly constrained by formal logic, the laws of nature and social stereotypes, new and unexpected combinations of images and ideas can emerge in their realm*. When these unusual combinations ascend into the realm of reflective consciousness, some of them are rejected by critical thinking (the censorship), while the others can give rise to new scientific theories. In essence, the relationships *between subconscious and conscious types of thinking* describe the relationships between *magical and scientific types of thinking.*

Indeed, as discussed above, the laws of magical sympathy and the phenomena of magical participation connect two independent objects that objectively have no link one to the other. In a similar way, through participation, symbols in our thinking work. For example, if in a war movie, which is placed in a certain socio-historical context, we see a knife piercing into a tree trunk, we understand that a war broke out. When in the same movie we see a dove descending on a broken and rusty tank, we know that a peace has come. The knife and the dove can be parts of both a war and a peace, but when they are put in specific contexts they symbolise either the war or the peace, by embracing the war or the peace as a whole, with all the armies and states involved. According to Freud and some modern theorists [25], our subconscious thinking operates not through concepts, but through symbols. But symbols are also the language of magical thinking. As mentioned above, being free from stiff limitations of formal logic magical thinking can generate original combinations of thoughts and thus play an important role in the search for scientific truth.

In point of fact, some scientists explicitly acknowledged that magical thinking had helped them to come to new ideas, either through subconscious processes, or via consciously designed thought experiments. For example, German chemist August Kekule, who discovered the ring structure of a benzene molecule, confessed that right before the good idea crossed his mind he had dozed off on a chair and had a day-dream of *a serpent* seizing its own tail (this is an ancient symbol known as the Ouroboros) [26]. To illustrate the Second Law of Thermodynamics, British physicist James Clerk Maxwell used the image of *a demon* who violated that law by sorting out fast molecules from slow ones and thus decreasing entropy in a closed physical system [27]. Einstein mentioned that the idea of special relativity theory entered his mind for the first time at the moment when he was *imagining himself* sitting on the end of a beam of light [28].

These revelations support the suggestion that a scientific discovery occurs not as inductive generalisation of known facts, but as a "sparkle" of magical thinking. New insights reveal themselves unexpectedly, through magical participation, which links together totally different images (e.g., a structure of a molecule and a snake biting its tail) in a way that is impossible to rationally explain. It is only after a discovery is made and supported by experimental facts that our rational mind brings the succession of events "in order", presenting the discovered law of nature as a logical conclusion from earlier established facts. In reality, as Einstein wrote, "There is no logical path to these laws; only intuition, resting on sympathetic understanding of experience, can reach them" [29]. In other words, magical thinking supplies rational thinking with new "theories in the making", and rational thinking sifts these theories through the filter of experience. At the same time, by backdating, rational thinking is trying to "fix" the discovery-making process in order to exclude magical thinking from the

picture.

Whereas some scientists, like Einstein, recognized the role of magical thinking in scientific creative process, they nevertheless refused to admit that magical phenomena participate in the order of nature. Einstein's maxim "god doesn't play dice" prohibits random processes from participating in fundamental laws of physics [30]. Indeed, by definition a random event is in principle unpredictable and undetermined by physical causes. From the perspective taken in this book this makes a random event *a magical event* of the "emergence/vanishing" type (see Tables 0.3 and 4.1). That is why in classical physics scientists don't allow random events to intervene in fundamental laws of nature. We call a result of a dice roll a random event, but only mean that the randomness comes from our inability to account for atmospheric noise and all the tiny variations in the effort of a throwing hand. But that doesn't mean that this result is random in the fundamental sense of the word, i.e. it cannot be causally explained "in principle". If we had a supercomputer, which could take into account all the forces that affect this individual dice throw, then we would be able to exactly predict the result. As it stands, a "random" event in the everyday life is only "pseudo-random".

Like it prohibits randomness, classical physics also forbids a direct effect of the Self on results of experiments. Of course, an experimenter may affect experimental results in many ways, but these "experimental biases" only happen due to inaccuracies of the experimental procedure. What is impossible is the magical direct "Self over matter" effect, e.g., affecting a result of throwing a coin by just thinking hard about the desired outcome. Indeed, if the experimenter's mind could directly affect a result of an experiment, this would undermine the objectivity principle, which is fundamental for science [31]. However, the emergence of quantum mechanics in the XX century

shattered the aforementioned prohibitions, thus opening a gate for magical effects to enter physical reality. It tuned out that randomness is an unavoidable element of quantum processes, and the observer's consciousness plays a definitive role in what the observed physical reality is.

Participatory universe: A magical impact of a conscious observer on reality

As mentioned above, the term “participation” was coined in the beginning of the XX century by French anthropologist Lucien Lévy-Bruhl [32]. Recall that participation is a magical bond between things that objectively have no relation one to the other. This bond works instantly and doesn't depend on distance between the bonded objects.

Similar invisible bonds and connections can exist between quantum objects of modern physics. The most close to “participation” is “quantum entanglement”. Quantum entanglement is a physical phenomenon that occurs when a pair of quantum objects is generated, which interact one with the other in a way such that the quantum state (e.g. spin) of each particle cannot be described independently of the other. If something happens with one of the entangled objects, then something also happens to the object’s entangled pair, even if arbitrary large distances separate the pair. It thus appears that one object of an entangled pair "knows" what measurement has been performed on the other, and with what outcome, even though there is no medium between the objects to pass this information through. It is no wonder that Einstein, Podolsky and Rosen, who first described this phenomenon as a thought experiment, considered it to be impossible because it violated the principle of physical causality [33]. Yet later this counterintuitive prediction was verified in experiments [34]. It turned out that information instantly and without any medium known to physics gets from one entangled quantum object to the other. Some physicists argue that

entanglement cannot be used for transmission of sensible information [35]. Nevertheless, the fact remains that some interaction between physical objects can happen in an instant, even if the objects are separated by a distance the size of the universe. In the mind of most adults today only gods could be present in many places at once, and for children Santa Claus has the same ability. Clearly, entanglement is not a cause-effect connection, because a cause precedes its effect in time. Quantum entanglement is a magical participation between two physical events, or, as Einstein once called it, a “spooky action at a distance”. The interesting attempts to explain quantum entanglement by retrocausality. This assumption suggests that a measurement made by a scientist on one of the entangled particles can instantly change the properties of the particle in the past, when this particle was in close contact with the other entangled particle. The signal then could travel forward in time to the other entangled particle [36]. However, retrocausality hypothesis simply replaces one magical effect (the participation between two events in space) with another (participation between two events in time)

Less obvious is the participation between an observer of quantum phenomena and the phenomena being observed. According to the Copenhagen interpretation of quantum mechanics [37], every quantum object, e.g. a photon, doesn't exist as a certain definite entity prior to being measured. Prior to an act of measurement the object exists in the “superposition state” - an indefinite probabilistic state when it is impossible to say whether the object is a particle or a wave. It is the act of measurement that defines in what capacity – of a particle or a wave – the object reveals itself. It means that an act of observation doesn't simply reflect reality in a way a mirror reflects an object, but participates in what this reality becomes, influences reality. In other words, there is a bond between an act of observation and the quantum entity being observed. But this

bond is not a cause-effect type, in which one physical object affects another physical object through one of the four known fundamental forces – electromagnetic, weak and strong nuclear, and gravitation. The bond between an observer and a quantum object is a magical bond, in which two fundamentally different realities interact: psychological (the observer's conscious decision to apply this or another way of measurement) and physical (a quantum object). A cause-effect type interaction between two quantum objects conforms to the law of energy conservation (e.g., a collision between an electron and a positron at low energy creates two gamma ray photons). For a magical type interaction the law of energy conservation is irrelevant, since in this interaction a quantum object interacts with the observer's subjective experience, which has no physical properties. As a result of such interaction, the quantum object doesn't turn into another quantum object, but adopts a certain form – of a particle or a wave. This phenomenon shows that *subjective reality of the observer is not a mirror that simply reflects the quantum event, but a medium that interacts with this event and affects this event during the interaction.*

Indeed, we can only interact with external objects through our senses, and our senses perceive the object via certain mediums – air, water, glass or electromagnetic fields – and these mediums put their marks on the resulting image of the object. For instance, seen under water the object looks bigger than if it is seen though air, white light can produce a spectre of colours if seen through a glass prism. In other words, the properties of the medium become an inseparable part of the final image of the object. Summarising, we could say that the medium has a certain “viscosity”, which offers a certain resistance to the thing-in-itself. Now, we also know that subjective reality is a magical medium, which is given to humans for observing the things-in-themselves. Observers cannot observe a quantum object as a thing-in-itself, they can only observe

the object clad in subjective experience. The question is whether subjective experience, like any medium, also possesses "viscosity" of some kind, or it is entirely transparent and exerts no resistance whatsoever. *If subjective experience were entirely transparent, it could not influence the collapse of the wave function.* The empirical fact that the fact of observation does affect the end result of the observation shows that subjective experience is a kind of medium that does put its mark on quantum objects. This is what participation between the observers' consciousness and physical reality means. *Exactly how human subjective experience, which is a non-physical entity, can directly affect physical objects, we cannot possibly know; but the fact that it can is always in front of us, in the form of our ability to intentionally move our bodies.*

The participation of a conscious observer in shaping physical reality can be illustrated by the famous "double slit experiment" [38]. In the classical version of this experiment a laser, which is a coherent light source, illuminates a plate that has two parallel identical slits cut in it. For simplicity's sake, let us call them Slit A and Slit B. On the screen behind the plate the light beam leaves a trace. The detectors placed at the slits show that each individual photon passes only through one of the slits, and not through both as it would be expected from a wave, and produces a single spot on the screen. Thus far each photon behaves as a single particle of matter. However, when the number of spots accumulates, they build bright and dark bands on the screen, which is an indication of interference – the phenomenon that is a property of waves, but not of particles. This proves that a photon can be both a particle, which has a fixed localisation in space, and a wave, which has no such localisation – the property called the wave-particle duality. Electrons and other elementary units of matter behave in a

similar way [39]. Although the wave-particle duality violates properties of an object of classical physics, so far the observer registers the result without affecting it.

However, a modified version of this experiment can show how an act of observation affects the process of the photon taking a form of either a particle or a wave [40]. A special prism converts every photon, emitted by the laser, into two entangled photons of a lower frequency, which then are focussed into two separate beams of light; for convenience, let us name these beams the upper and the lower ones. Next, one of the beams – the lower one – goes through the double slit plate and the detector screen at the other side registers the expected interference pattern. At this stage a new element is introduced in the experiment: a special device "marks" the photons, by producing clockwise circular polarisation of the photons that went through Slit A, and counter-clockwise circular polarisation of photons that went through Slit B. As a result, an observer knows which path each individual photon of the lower beam took. After this the interference pattern on the detector screen disappears. Finally, another device gives the photons of the upper beam, which did not go through the double slit plate, a diagonal polarization. By engagement, the upper beam gives diagonal polarisation to its pair – the lower beam. This erases the effect of circular polarisation of the lower beam, which now becomes a mix of clockwise and counter-clockwise polarized photons. The photons of the lower beam are no longer marked and the detector screen of the lower beam can no longer determine through which slit each individual photon passed. As a result, the interference pattern on the detector screen reappears. The conclusion is clear: when the observer knew which path in space had been taken by each photon, the photons behaved as particles, and when the observer didn't know "which path" - the same photons behaved as waves. *It looks as though the observer's knowledge about the quantum object's way "condenses" it into a distinct object – a*

particle – whereas when the knowledge about "which path" is absent, the quantum object "dissolves" in space as a wave.

On first glance, this effect of the observer on the observed is purely mechanical and is not a direct effect of human Self on matter. The way a quantum object collapses depends on our choice of a measuring device, and not on our will or desire. In this regard the results of the double slit experiment are no different from results of any observation in which physical devices are used. Thus, the same physical object looks differently when seen through lenses of different magnification capacity, through different colour filters or different mediums. There is, however, an important difference between observation of macro objects and observation of a quantum object. *Observing a macro object can change its appearance, but not its essence*. For example, we can use different methods to determine the objects' molecular structure, chemical properties, temperature or weight, and the results will be the same independently of the methods; the results will be also independent of whether we see the object as big (when close to us) or small (when at a distance from us), red (under the red light) or green (under the green light). In contrast, the way we observe a quantum object defines the object's essence – to be either a particle or a wave. This specific feature of the quantum measurement allows us to say that *in the quantum world measurement involves a direct effect of a conscious observer on the quantum object: The observer's decision to ask nature a question, through his or her choice of a measurement device, defines the fundamental properties of the natural object – being either a particle or a wave.*

One might ask what all of this has to do with consciousness. Indeed, photons and electrons are being registered not directly by our consciousness, but by devices. But this question is wrongly put. Directly our consciousness can't register not only

photons and electrons, but also any object at all. In order to be able to see something, feel the taste of something, or hear something we need special devices: the retina in our eyes, taste buds in our mouth, or eardrums in our ears. Such things as “redness”, “saltiness” or “loudness” do not exist in nature; what exists in nature are electromagnetic waves of a certain length and frequency, molecular structure of a grain of salt, and amplitude of the sound waves' vibration (see Chapters 3 for more on this). It is our perceptual organs (eyes, mouth, ears) and brain that convert these natural structures in subjective experience – colour, taste, sound, and a geometrical pattern. Devices that allow us to “see” photons and electrons are our “artificial eyes”, which convert some invisible reality into the reality accessible to our perception – traces of photons or electrons on a detector screen. In other words, *physical devices are an extension of our sense organs, through which our consciousness can see the world; therefore, these devices are part of our consciousness.* Thus, irrespective of the physical processes that happen inside the observing device in the double slit experiment, the end results that are interpreted by observers are the visible marks on the detector screens – separate dots or interference patterns – which are parts of human subjective experience. *This makes the whole observing device an extension of human subjective experience, and the observer’s effect on the collapse of a quantum object a direct Self over matter magical phenomenon.*

An interesting twist of this experiment is an experiment in which the decision of whether to erase or not to erase the information about “which path” is taken after the photons, which went through the slits in the slate, reached the detector screen [41]. This is achieved by converting each photon into two entangled twins *after* it went through the slit, and *not before* as it was in the previous experiment. As a result, there emerges four beams: to upper beams (one from the photons that went through Slit A,

and the other from photons that went through Slit B) and two lower beams, which are the upper beams' twins. It is arranged that the two upper beams reach the detector screen sooner than the two lower beams. After the upper beams “collapsed” and produced a certain pattern on the detector screen, each of the two lower beams, which are still on their way toward the detector screen, is converted into two entangled beams again. In two of the four resulting beams, which are still travelling toward the detector screen, the information about the path is erased. And now the important bit: the photons of the upper beams that had been entangled with those lower beams' twins in which the information about the path in space was available, behaved as particles; in contrast, those photons of the upper beams that had been entangled with the lower beams' twins in which the information about the path was erased, behaved as waves and produced the interference pattern. The amazing feature of this experiment is the fact, that the decision of whether to erase or not to erase information “which path” in the lower twins was taken after the upper twins had already reached the detector-screen and “made a decision” of whether to become a particle or a wave. It appears that the upper photons “knew in advance” what would happen to their entangled lower beams' twins.

To summarise, depending of whether the observer knows or doesn't know the quantum object's localisation, the object will collapse either in the form of a particle, or in the form of a wave. Even more wonderful is the fact that the object “knows” in advance whether its spatial path will or will not be observed, and “acts” accordingly. In other words, as some physicists suggest, at the fundamental level our universe might be a “participatory phenomenon” [15]. What it could mean is that a magical phenomenon – direct Self over matter – is registered in experiments of modern physics.

The experiments describe above clearly demonstrate that human subjective reality is a medium that exerts resistance on things-in-themselves. The experiments show that, when unobserved, a quantum object tends to collapse as a wave. This suggests that collapsing as a wave is a "normal" behaviour of a quantum object; if this is the case, then *the object collapsing as a particle can be interpreted as a regular distortion, brought in the object's normal behaviour by the fact of an observation.* Through this distortion, the viscosity of human subjective reality is revealed – the viscosity that could not be revealed when we observe macro objects, due to the nearly absolute "transparency" of the subjective reality as a medium. As the last of the above experiments suggests, this viscosity works not only in space but also in time, passing the information backwards through entanglement.

So far so good. We established that magical thinking could play a vital role in scientific discoveries. We also revealed that in quantum physics of the XX magical phenomena, such as participation and direct Self over matter, could occur not only within magical thinking, but also in physical reality itself. The evidence, which upgraded magical phenomena from being imaginary events to the status of real events, was obtained through rigorous experiments. The belief in the supernatural, that modern educated people implicitly hold, didn't play a role in these developments.

Yet the same experiments that demonstrated the definitive role of an observer in shaping the states of quantum objects brought physicists to the threshold, beyond which lies the realm of reality where experiments become inconceivable. In this hypothetical realm only mathematics and theoretical reasoning hold sway. And where the empirical verification of theories is impossible, there appears a possibility for the implicit belief in magic to sneak into the body of physical knowledge.

Crossing the threshold: From participatory universe to the multiverse, and further along the line

One influential theory of modern physics, which is difficult to distinguish from pure magic, is the so called "many-worlds interpretation" in quantum mechanics. According to this theory, put forward by American physicist Hugh Everett [42], any measurement of a quantum object, for example, a fixation of a photon on a photographic plate as a spot of light (usually called "the wave function collapse") creates not a single version of this object, as Copenhagen interpretation of quantum mechanics insists, but splits the universe into the version that we see and the other possible versions, which stay invisible for us. Everett called his interpretation "the universal wave function interpretation", and American physicist Bryce DeWitt later renamed this theory "many worlds interpretation" (MWI)[43]. DeWitt elaborated that by every quantum measurement an observer unintentionally creates multiple universes-worlds, each including a copy of the observer inside it. It is hard to avoid a conclusion that in this interpretation of quantum measurement *an observer is a creator of the worlds, with the only difference that God of the Bible created the universe willingly by inspiration, whereas the "quantum god" manufactures universes unintentionally*. To believe or not to believe in this theory is a matter of preference. The question that some scientists ask is whether this theory could be tested in experiments [44]. According to cosmologist Max Tegmark it could, but only at the cost of "quantum suicide". Unfortunately, if the MWI is true (which is yet unknown), then by committing the quantum suicide you might prove this theory to yourself but will never be able to prove it to anyone else [45].

The MWI is not the only theory that proposes the existence of other universes. In the recent decades, there appeared a number of theories in which our universe is only a

unit in a potentially infinite number of universes. To mention just a few, hypotheses were proposed for quilted universe, inflatory multiverse, brain multiverse, cyclic multiverse, landscape multiverse, holographic multiverse, and simulated multiverse [46]. For example, it was suggested that the simulated multiverse exists on a complex system of computers that is capable to simulate entire universes. An interesting question is *who is the holder of this magical system of computers, which can simulate not only stars and galaxies, but life and human consciousness as well?* And of course, none of these theoretical constructions can be verified in experiments.

Finally, "string theory" is replacing the point-like particles of matter, such as protons and electrons, by one-dimensional objects called "strings" [47]. This theory's advantage is that it explains all known types of elementary particles through these particles' "quantum states"; it also explains all four known fundamental forces – electromagnetism, weak and strong nuclear, and gravitation. A distinguished feature of string theory is that it postulates, on top of the known four dimensions (three in space and one in time), other dimensions as well. For example, in the "superstring" version of string theory there are 11 dimensions, with the extra 7 dimensions being packed into a compact "ball" called Calabi-Yau space. With all the advantages of string theory it has been impossible thus far to test this theory in experiment because of the unimaginably small size of the strings (the so called Planck length), and inaccessibility of the "extra dimensions" [48]. An extension of string theory is "M-theory", which is trying to unite all the versions of string theory. M-theory suggests that strings are one-dimensional versions of yet more fundamental entity – the two-dimensional membrane, which vibrates in the 11- dimensional space. Some physicists call M-theory "a theory of everything", because in this theory all the diversity of the

physical universe is reduced to one theoretical construct. *Because vibration of strings and membranes is a final "point of reference" and doesn't conform to any natural causes, this vibration must be a magical phenomenon.* This might be a reason of why some physicists decipher the term "M-theory" as "magical" or "mystical" theory [49]. As the idea that subjective reality of an observer participates in the structure of the universe became increasingly accepted in physics, the degree of this participation grew. American physicist John Archibald Wheeler condensed this idea in his expression "it from bit" He writes, "It from bit symbolizes the idea that every item of the physical world has at bottom — at a very deep bottom, in most instances — an immaterial source and explanation; that what we call reality arises in the last analysis from the posing of yes-no questions and the registering of equipment-evoked responses; in short, that all things physical are information-theoretic in origin and this is a participatory universe [50, p.311]. This means that scientists, through observing devices, ask nature questions that have only two possible answers: Yes or no. As we know, this binary answer makes a unit of information, or a "bit". Wheeler's approach was a suggestion to put the unit of information at the foundation of quantum mechanics, which included observer into the construction of reality. The extension of this theory was the "information theoretic approach" - the attempt to derive a version of quantum mechanical world from "universal bits of information" on the basis of certain principles of the general probability theory [51]. According to this theory, there is no need in postulating any "objective" physical reality out there, and the Kantian "thing-in-itself" could come to rest; instead, the regularities of the universe can emerge automatically, from human subjective experiences and probabilistic algorithmic rules; because of these rules, the random events condense into something that reminds the laws of nature as we know them from mainstream quantum physics.

Unfortunately, none of these theoretical constructions can be empirically proven. These hypotheses are about the "final cause" of both the observed universe and the hypothetical other universes that cannot be observed currently or in principle. Because the final cause cannot be further reduced to any natural causes, it is by definition a "something from nothing" type magical event. The interesting twist is the information theoretic approach to quantum mechanics, which proposes that *random events, which are essentially magical, are capable of organising themselves into regular patterns that resemble the laws of nature.* Through the hypotheses that tacitly imply a magical event, the implicit belief in the supernatural, which thus far has been locked deep in the scientists' subconscious, claims its right for public attention.

Thus far, we have been primarily concentrating on how magical phenomena infiltrate physics of the micro world. And what is happening in physics of the mega world – cosmology?

Magic of the mega world

It has always seemed to me that the Big Bang is an event that is no less magical than is the biblical version of world's creation by God in six days. For the infinitesimally small fraction of a second (and for the human perception – instantly) the universe emerged form virtually "nothing" - an incredibly dense and tiny point called the point of singularity - and has been inflating ever since [52]. By definition, *when something as big as the universe emerges from something the size of almost a mathematical point – this is an "emergence from nothing" magical phenomenon, which escapes the known laws of physics.* What makes this event look even more magical is that in this

magically inflated universe there appears an observer who is able to understand this universe and is puzzled by the impossibility to logically explain its origin.

Pondering the role of an observer in the universe, British physicist Jim Baggott recalls an old philosophy problem: If a tree falls in the forest, and there's nobody around to hear, does it make a sound? According to this author, the answer depends on how we define sound. There is no sound as subjective quality, but there is sound as "auditory waves in the air" [14]. This answer is valid but incomplete, because the notion "auditory waves in the air" is a result of human intellectual activity; hence this notion (as all notions of science for that matter) is a product of human consciousness. This implies that without a sentient being, which hears the sound or thinks about the sound, the sound isn't there. And what is there? There is "something", about which we can say nothing except: if this "something" interacts with our ears, we experience what is called "sound", and which we understand by creating the concept "sound waves in the air".

The same applies to the universe as a whole. Without a person who experiences sounds and colours of the universe and creates theories about what they are, there is only "something". There are no photons and electrons, no black holes, no stars and planets without a human being who thinks and reasons about these entities. One might ask: Does it mean that people, like artists, create the universe as they wish? Of course it doesn't. The universe exists independently of our consciousness, as "something" out there. But *what this "something" really is like we can only find out if we "mix" this "something" with our consciousness, like we mix sugar with water.* Literally "mix with", and not "get through" our consciousness, like a light beam gets through clear glass. The beam of light gets through clear glass unchanged, but the "something" of the universe, when it mixes with our consciousness, creates a unique "fusion". *This*

fusion of things-in-themselves and human subjective reality we call electrons, stars and galaxies.

It is *because physical universe is a part of our own mind that we can understand the laws of nature.* Something, which is not a part of our conscious experience, like the other universes, cannot be understood in principle. Exactly because the physical world is a part of our mind, we observe the wonderful "tuning" of the universal physical constants to each other in such a way that their "ensemble" makes it possible for life and humans to exist [53]. Indeed, if one of those fundamental constants (e.g., the gravitational constant g, which defines the speed of the universe's expansion) were just a little bit different, life in the universe would be impossible. Likewise, if the universe were a little bit younger or older that it is now, there would be no us, because there would be no the elements from which our bodies are built. The problem arises as to who tuned the "piano of the universe" so finely? Who was that wizard, which made the fundamental constants fit so perfectly to each other that life became possible in the universe?

The awareness of this problem gave rise to the "anthropic principle" in cosmology, introduced by Australian physicist Brandon Carter in 1973 [54]. The *weak anthropic principle* suggests that the universe's fine tuning is a random event, and because our universe is so nicely tuned for us to exist, we can only observe this universe and none of the other [55]. The weak anthropic principle leads to a conclusion that there must be an infinitely large number of universes from which our universe is the only lucky one to have human observers.

The *strong anthropic principle* goes much further than the weak anthropic principle, and proposes that the existence of conscious observers (and therefore, life) is not a

random event but a necessary condition for the existence of the universe. Conscious observers participate in shaping the universe as it is. This version of the anthropic principle is compatible with Copenhagen interpretation, as well as with information based versions of quantum theory, but it also allows for the possibility of the classic argument of intelligent design (see Chapter 1): The universe designed so cleverly could not have emerged on its own. Because the strong anthropic principle does not exclude the Creator, many scientists argue in favour of the weak anthropic principle, witch is compatible with the many worlds interpretation of quantum mechanics (see Chapter 5 for more on anthropic principle).

But the hope to avoid the Creator by downgrading the anthropic principle is an illusion. As argued in the Introduction, a random event in its own right is a non-causal "something from nothing" magical event. *Instead of one purposefully created universe that the strong anthropic principle implies, the weak anthropic principle allows for the possibility of an infinite number of magical events.* The attempt to deal with this problem is proposed in the information theoretic approach towards quantum theory. This approach aims to show that, if certain rules are applied to random events, these events have a potential to built themselves into regular patterns that are similar to those we call the laws of nature [51]. But these rules or postulates (e.g., Continuous reversibility, Tomographic locality or Existence of a fundamental information unit) are not arbitrarily selected; they are based on the existing general probability theory, which in its own right is based on experience and observations. Thus, these postulates can be interpreted as the information theory versions of fundamental physical constants, which brings us back to the strong anthropic principle.

Both versions of the anthropic principle implicitly involve an element of the belief in the supernatural in still another way. Indeed, as mentioned above, according to

astrology there is a magical kinship, or sympathy, between people and planets. But the "pre-established harmony" between the human mind and the laws of nature is a core feature of the anthropic principle as well. Hence *the link between the sympathetic magical thinking and the anthropic principle:* astrologists can read a person's fate by using the "language of planets", and modern scientists can "speak" to nature using the language of physical laws.

Conclusion: From the Standard Model to magical physics

We started this chapter with the question: How and why did it happen that some influential theories of modern physics and cosmology describe events, which are indistinguishable from magic?

Searching for an answer, we turned to the recent psychological studies on magical thinking and magical beliefs in modern people. These studies revealed that magical thinking is wired in the human mind and shows up in dreams, art and fantasies. Being confined to the realm of the imagination, magical thinking doesn't contradict modern peoples' belief in science, and peacefully coexists with logical thinking in the peoples' minds. By contrast, the belief in magic in modern industrial cultures is viewed to be a fallacy and is thought to remain only in children and a small number of superstitious adults.

Yet psychological experiments of the recent decades have shown that modern educated adults, who consciously consider themselves non-believers in magic, in their subconscious believe in the supernatural. The dominant belief in science prevents rational people from admitting their hidden belief in magic. Nevertheless, in certain circumstances the implicit belief in the supernatural gets access into the realm of reflective thinking and rationally controlled behaviour. When this happens, rational

adults openly acknowledge that magical phenomena are not just fantasies but can produce effects in the real world.

The subconscious belief of rational people in the supernatural was one of the factors that contributed toward the "merger" between magical thinking and physical theories. This hidden belief created a psychological predisposition for magical phenomena to be invited into the realm of rational theorising. This predisposition alone, however, was far from being sufficient to allow the "merger" to happen. Brought up by classical physics, modern specialists on quantum theory and cosmology are strongly opposed to the idea that their theories could benefit from magic in any way. Some other factors had to join the psychological predisposition in order the theorists, though reluctantly, had to accept the magical phenomena into their theoretical construction.

The second factor that contributed toward the "merger" was *the link between magical and scientific types of thinking* in the search for truth. Magical thinking operates in the subconscious through symbols and is a "generator of ideas"; it supplies scientific thinking with a pool of "theories in the making". Scientific thinking selects from that pool those theories, which resonate with objective reality, and rejects those that don't fit. In the process of this selection, scientific thinking uses two main criteria: Verification by experimental facts and compliance of the "raw theories" with the general body of existing physical knowledge. The link between magical and scientific thinking is a necessary condition of scientific discoveries. This link creates "an umbilical cord", through which magical phenomena could penetrate into scientific theories. Usually however, such penetration is prevented by experimental verification of the "raw theories" supplied by magical thinking. Even combined with the hidden belief in magic, the link between magical and scientific thinking for centuries failed to advance magical phenomena into the world created by physical science.

The third – and crucial- factor that caused the aforementioned "merger" is *the progress of physical science itself*. As physics proceeded from the macro world into the micro and mega worlds, the concept of a physical object changed. From an object that can be seen by a naked eye the physical object turned into an object, which can be deduced from traces it leaves in various mediums. No longer supported by direct sensual experience, the physical object increasingly depends on structure of observing devices. The incredible sensitivity of these devices made the fundamental link between human consciousness and physical objects evident. As a result, magical phenomena, such as direct "Self over matter" and "participation", tacitly appear in physics under the names of Copenhagen interpretation and quantum non-locality, and in cosmology under the title of anthropic principle. Nevertheless, up till 1970-th of the XX century, a bunch of quantum theories called the Standard Model [56] coordinated themselves with experimental facts. The magical phenomena in physics were proven empirically, yet these phenomena were interpreted as natural ones.

Finally, when theoretical physics moved further away from empirical reality and in the realm of such theories as the string theory and the many worlds theory, experiments became impossible. A major reality check criterion – measurements and experiments - needed to separate rational constructions concordant with observed phenomena from magical phenomena (see Figure 3.1), disappeared. The remaining criterion - compliance of the "theories in the making" with the general body of current physical knowledge - is significantly more flexible and "soft" than the experimental reality check. The thinning of the border between magical and scientific thinking, combined with the tacit belief in the supernatural, made it possible for magical phenomena to filter through into some theories of modern physics. What in the world of classical physics is magic (e.g., creation of a universe by an act of consciousness),

in some theories of modern physics (e.g., the “many worlds” theory, the “information theoretic” theory) is admitted as reality. Physical scientists, who otherwise reject magic as superstition, become more benevolent when magical evens come to them clad into sophisticated mathematics and are inaccessible to experimental reality check.

Is the merger between magic and science a step forward toward the truth about reality, or is it a step back toward medieval astrology and alchemy? I think, it’s a bit of both, and this merger was destined to happen. There was a time when physics separated itself from magic by dismissing the possibility of magical phenomena; this separation allowed the humankind to make an explosive leap forward in its capacity to control nature. What made this leap possible was the idea of objectivity of knowledge rooted in the invention of a scientific experiment. But, with physics rejecting the supernatural, the *primary role of subjective experience in creating scientific concepts* (see Chapter 3 for more on that) was only temporarily suspended.

Now physical science approached the borderline where it again, at a more advanced level, faced the phenomenon of magical participation - the deep level unity between a person and the universe. Beyond this borderline the realm of concepts lies so general that experimenting with the underlying reality becomes impossible. Some physicists stop at this threshold; but others, armed with mathematics and the imagination, venture into this uncharted territory.

And the belief in the supernatural, which thus far has been locked in the dungeon of the subconscious, is filtering into the very heart of physics – theories of the origin and structure of the universe.

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Chapter 5. The Pull of Eternity: Hope for Immortality as the Belief in the Supernatural

Abstract

Certain ideas and practices in modern science suggest that there exists among scientists the hope for immortality of a person's mind and the humankind. The presence of such hope follows from the fact that considerable efforts and resources are spent on exploring the issues which are beyond the life span of a person and humankind. Humankind exists on the time scale of thousands of years, whereas the universe exists on the time scale a million times longer. The difference between these time scales makes any prognoses regarding the fate of Earth and the universe beyond a few thousand years impractical. Why then scientists and institutions devote time and resources to such issues as the future of Earth and the universe in billions of years from now? Why do modern states spend billions of dollars on exploration of objects located hundreds of millions of light years away from our galaxy, or on the search of

new quantum particles of matter? Why predictions are made as for the fate of humankind on the cosmic scale of billions of years? The answers can be found in recent psychological studies on magical beliefs in modern humans. These studies have shown that the belief in the supernatural is common not only among small children today, but also among educated rational adults who consciously view themselves as non-believers in magic and in god. This implicit belief feeds our hope for immortality of a person's mind and the humankind.

Problem: Why are we not solipsists?

The current of time's river
Will carry off all human deeds
And sink into oblivion
All peoples, kingdoms and their kings.

G.R. Derzhavin [1]

In his autobiography British film director Michael Winner mentioned that his earliest memory was a lamplighter igniting the gas jets on the lampposts. "One day – he continued – lights will go out… Movie lights will shine on. But not for me. The lights gripped me from the beginning and they will until the end. I've spent my life among them. They've lightened the dark" [2, p.2]. This image of the unavoidable cycle of a person's life reminded me the simple truth known to the ancients: Man is the measure

of all things. A human person is that very “god” who creates and supports his or her private universe. The person will pass away and his or her private universe will cease to exist, as silently and completely, as it appeared when the person was born. There will be no more physical theories, megaparsecs of space and billions of years of time. There will be no need to be concerned about the fact that sometime in the distant future the Sun will swallow the Earth and there will be no place for people to live in. Surely, our private universe will “burn out” much sooner than that. What will happen after that is not to worry. Philosophers call this point of view “solipsism”.

“But our children and our deeds will remain” – a reader might say. That is true. But for how long? What time is left for humanity to exist? According to most anthropologists, modern humans have been around for approximately 200 thousand years, civilisation – 12 thousand years, human history – 4.5 thousand years [3]. But the universe exists 14 billion years, Earth – 4.5 billion years. Cosmologists predict that in 1.1 billion years, due to the increased solar activity, oceans on Earth will evaporate, and in 7.5 billion years our Sun will turn into a Red Giant and annihilate Earth [4]. According to the cosmic calendar, if the age of the universe takes a year and the age of the solar system takes around 4 months, then modern humans existed for 7 minutes, history from the beginning of literacy lasted for 9 seconds, and the most long individual human life – for 0.25 second [5]. It is clear that the existence of modern humans takes a very small time compared to the existence of the universe, and the length of human history proportionally is still much smaller. Humankind lives on the scale of thousands of years, and the universe – on the scale of billions of years, that is a million times longer. There are a number of scenarios that can bring humankind to its death and do it fast, including nuclear annihilation, biological warfare, global pandemic, ecological collapse, global warming, meteor impact and volcanism [6]. In

other words, on the cosmic scale life of humankind, not to mention that of a human individual, is incomparably short and unimaginably fragile, and if you are not a fiction writer then searching for knowledge on the distant future of cosmos beyond a few thousand years makes no practical sense.

And yet we observe an amazing phenomenon of "cosmic thinking": Billions of dollars are being spent every year on studying galaxies that are on the edge of the visible universe, and on discovering quantum particles which can only have theoretical significance. For instance, the cost of the Hubble Space Telescope is estimated over $2.5 billions only to construct, the total operating budget of the Large Hadron Collider runs to about $1 billion per year, while the total cost of finding the Higgs boson with the help of the LHC ran about $13.25 billions. Renowned physicists and cosmologists consider various scenarios of the end of the world (e.g., the heat death of the universe, or the collapse into a singularity point similar to the one that gave birth to Big Bang) [7] and the end of Earth [4], specialists on cybernetics discuss the possibilities of replacing humans with intelligent machines [8] and turning the whole universe into the omnipowerful and omniscient computer [9], philosophers contemplate the attainment by our universe the state of divine unification in the hypothetical "Omega Point" [10]. Ordinary folk like ourselves too can't imagine the world without us. Thinking of the past or the future we are always present there in person, as if looking at this imagined world "from above". We can even think about the world prior to Big Bang, without the universe, without space and time, but amazingly we are still there. In other words, consciously or unconsciously we live our lives as though we were immortal. In people who believe in God the hope for immortality of the soul is assigned by their faith, but *why is this hope implicitly*

present in people who consciously deny their belief in god and in the supernatural? In other words, why are we not solipsists?

In this chapter we will discuss psychological grounds of the phenomenon of cosmic thinking. We will try to explore the possibility that at the base of this phenomenon is rational adults' implicit hope for immortality of the mind (soul) and the humankind. Although subtle differences exist between the concepts “a soul” and “the mind”, in this chapter these concepts will be used interchangeably. We will try to investigate, whether recent studies on magical beliefs in modern people could provide new insights on the causes of the phenomenon of cosmic thinking.

Belief in the supernatural and the hope for immortality

For Babylonians, Sumerians and early Egyptians planets, Sun and Moon were gods – living entities capable of hearing and understanding human prayers [11]. These gods ruled cycles of the year, rainfalls and sea tides. Even the founder of European philosophy Thales of Miletus, who lived in the V century BC, believed that “all things were full of gods”[12]. As argued in Part I of this book, with the belief in gods and spirits comes as a result of the belief in immortality of the human soul. The ancient burials with human artefacts indicate that people started to believe in that physical death is not the end of a person, and that a person’s soul survives physical death and proceeds in a special invisible realm, where it becomes a spirit. The spirits of dead ancestors became worshiped as the first gods. Eventually the belief in spirits was extended from people to animals and natural things, giving birth to the belief in animism. If animals, and even physical objects have spirits inside them, then it is possible for a human person to address those spirits and affect physical objects spiritually, via magical spells and rituals. This belief in the ability to affect nature by

the sheer effort of the mind became known as the ability of magic, or the supernatural (see the Introduction). From the above it follows, that *the belief in magic is linked to the belief in the immortality of soul (IS), and vice versa*. And indeed, as history shows, the belief in magic and in IS go hand in hand, culminating in mummification rituals of early Egyptians, Greek's myths of the underworld and Christian's belief in afterlife.

To investigate, whether the belief in magic and the IS are linked one to the other in modern people, an experiment was designed. Participants (university graduates and undergraduates in the Soviet Union and West Germany) were shown an apparently magical phenomenon: An experimenter transformed a physical object by sheer power of his mind. The participants were then interviewed on whether they believed in that they had witnessed an instance of real magic, and also on whether believed in the IS and in the existence of the Supreme Being. The results revealed a significant correlation to exist between the beliefs in magic and the IS; the belief in the IS also significantly correlated with the belief in the Supreme Being [13]. This shows that those of modern adults who openly acknowledge their belief in the supernatural (e.g., direct Self over matter magic), also acknowledge their belief in the IS. But what about those of rational adults, who consciously deny their belief in the supernatural? Why would modern physicists and cosmologists believe in the IS, if most of them consider themselves non-believers in magic or in god?

However, as argued in the previous chapters, recent psychological studies have shown that "at the bottom of the mind", in the realm of subconscious, most rational adults keep believing in magic. An example of such belief is the belief in the law of sympathy - the belief that there is a supernatural link between objects that represent one another, while having no physical causal link one to the other at the same time

(see Table 4.1 in Chapter 4 for more on laws of magic). For example, in medieval Britain people protected themselves from witchcraft through making a doll of the witch out of rags and then piercing them with pins, with the intention of causing physical harm on the witch and breaking their charm [14]. With the aim to examine whether the belief in magical sympathy works with educated people today, participants (university students) were asked to stick a needle into a doll. The doll was representing either a person who, by his or her improper behaviour earlier in the experiment, made the participants think badly of him or her, or a person who had displayed a positive pattern of behaviour. When later the person who the doll represented started complaining about having a bad headache, participants who had been made having bad feelings about the person acknowledged that they felt responsible for the person's misfortune, as if their manipulations with the doll were the cause of the person's headache [15]. Other studies revealed that, under certain circumstances, most modern rational adults openly acknowledge that they believe in direct Self over matter magic [16][17].

The genetic link between the belief in magic and in the IS, supported by the historical analysis and psychological studies, suggests that *subconscious belief of modern rational adults in the supernatural must be accompanied by the implicit hope for immortality of the mind (soul).* This might provide an answer to the main question asked in this chapter: Why modern rational adults, who openly deny immortality of the soul, behave in a way as if the human mind and the humankind were immortal.

Having taken on board the hypothesis that the belief in the supernatural implies the hope for IS, let us look more closely at how it happened that the belief in the IS,

which came to the ancients naturally, in the modern world became abolished, and how modern people react to this fact.

A person and the universe: Conflict of the worlds

The ancient Greeks believed that they were at the centre of the world. They lived on Earth. Around Earth gods-planets revolved with which humans communicated through prayers and rituals and in whose realm human souls passed after death. People believed in the cosmic link between a person and the surrounding world.

Gradually, however, the Greek's vision of the gods changed: The behaviour of the gods became less capricious and more predictable. Antikythera mechanism - an ancient analogue computer, created in the year 100-150 BC and used to predict astronomical positions and eclipses for calendric and astrological purposes, symbolizes this shift in the antique mind. Such "restraining" the cosmic gods' behaviour was later spread over the whole nature and gave birth to the notion "the laws of nature", and eventually to modern science. Due to the achievements of science in the XVIII-XIX centuries AD, in industrial countries the belief in animism became the privilege of small children and a limited number of superstitious adults. As science rejected the belief in magic and animism, so it did to the belief in that a human soul (the mind) is immortal and survives death of the body.

By stating that the laws of nature are independent from human observers, science erected a stonewall between a person and the universe. People started to feel themselves living on a tiny island lost in the boundless ocean of the cold and indifferent universe. Even here on Earth, in people's own home, science did not leave the people much ground for being proud of themselves, by reducing all their

inspirations and achievement to the interplay of soulless selfish genes [18]. Modern science contends that the soul is an illusion that accompanies the work of the brain, and when the brain stops functioning the person vanishes from the world [19]. As British philosopher Bertrand Russell eloquently put it, “That man is the product of causes which had no prevision of the end they were achieving; that his origin, his growth, his hopes and fears, his loves and his beliefs, are but the outcome of accidental collocations of atoms; … that all the labours of the ages, all the devotion, all the inspiration, all the noonday brightness of human genius, are destined to extinction in the vast death of the solar system, and that the whole temple of Man's achievement must inevitably be buried beneath the debris of a universe in ruins” [20].

Not surprisingly, in this soulless and heartless world a person started to feel uncomfortable. While in the magical universe gods gave meaning to the existence of both people and the world, in the scientific universe this meaning was lost. A conflict emerged between the human mind, which is desperate for meaning and eternal life, and the meaningless world created by science. And the attempts appeared to break away from the claws of the world that science had created. The belief in the IS that still lurks in modern people’s subconscious began to feed the hope for the miracle – for the chance that the scientific view of the world, with all its formidable convincing power, is missing something important. A search for evidence began that there are phenomena in the world that surpass the laws of nature.

A search for evidence

One of these phenomena is the magical participation *between an individual’s fate and the planets* [21]. According to the Alexandrian astrological tradition [22], a person’s fate can be predicted on the basis of astrological charts. French mathematician Michel

Gauquelin [23][24] statistically examined the "Mars effect" – the astrologists' claim that people born just after the planet Mars raises or culminates become outstanding athletes in various sports. To his own surprise he indeed found a significant statistical correlation between the fact of being born "under the influence of Mars" and athletic talents. Later similar correlations were established between Jupiter and the ability to theatrical acting and Saturn and the ability to scientific activity. British psychologist Hans Eysenk (known for his concepts of personality dimensions "introversion" and "neuroticism"), who used to take astrology with scepticism, checked the correlations and confirmed their validity [25]. Eysenk's colleagues Mayo and White [26] further extended the analogy and showed that people born under odd Zodiac Signs are usually extraverts and those born under even Zodiac Signs tend to be introverts. Later attempts to replicate Gauquelin's study failed and the study's effects were explained by selection bias and statistical inaccuracies [27]. Surprisingly, for myself the study worked well. Having red Gauquelin's results, I immediately checked for my data (I was born on January 15); and indeed, all was in place: Born under the even Zodiac Sign – Capricorn - (I am a clear introvert) and under the influence of Saturn (I devoted myself to scientific profession).

Another form of magical phenomena is *paranormal psychological effects*, such as psychokinesis – a direct effect of thinking on inanimate matter. Proving that a direct action of our Self could affect physical processes would radically change our vision of the world. This is because this fact would show that something immaterial – a human subjective experience – is able to affect matter, and do this not through one of the four known types of physical forces.

“Hold on – a reader might say, - but aren't modern prosthetic devices react to the brain signals an application of telekinesis?” No they are not. As argued in Chapters 3 and 4, communication between a person and prosthetic devices occurs not through semantics, but by electromagnetic impulses produced by the brain. It is the “communication” between a person’s mind and his or her brain, which is indeed a magical phenomenon, whereas the brain connects to a prosthetic device strictly through a physical force (see Table 0.3 in the Introduction).

In contrast, if the Self could directly affect matter this would mean that subjective experience is not an illusion but has a real “presence” in the physical universe. Interestingly, the possibility of this kind of direct influence of a human thought on certain physical processes has been examined experimentally and the studies indeed found statistically significant effects. Although such effects are weak and cannot be used for any practical purposes, they are nevertheless real [28][29][30]. Being curious and a disbeliever in parapsychology I attempted two studies myself: One on psychokinetic effects [31] and the other (together with an ESP researcher Adrian Ryan) on extrasensory perception [32]. To my surprise, despite some inconsistencies in the results across experiments, in both studies statistically significant positive paranormal effects were obtained (see Chapter 6 for more on these studies). Nevertheless, today most scientists believe that paranormal effects lack sufficient experimental support and are impossible to replicate.

One more manifestation of the supernatural, which directly leads to the hope for immortality, is *“near death experience”.* In his book “Life after life” American psychologist and medical doctor Raymond Moody reviewed hundreds of cases in which people who had been pronounced clinically dead but were subsequently

resuscitated described their memories [33]. These memories include such common episodes as going out of the body, levitation, the overwhelming feeling of peace, security and warmth, the feeling of the unity with the universe and a fast movement along a tunnel towards a source of light. The important element of this extraordinary experience is obtaining a new vision of themselves and the universe. According to Gallup poll, only in the US around 8 millions of people reported this kind of experience [34]. Interestingly, in a considerable number of such patients the fear of death disappears. Yet, at present most scientists interpret near death experiences not as a proof of life after death, but as hallucinations elicited by the dying brain.

Still another manifestation of our implicit faith in the magical unity between a person and the universe is *science fiction*, served with existing facts and spiced with enthralling speculations. Books by Erich von Däniken gave rise to Ancient Astronauts theory [35]. According to advocates of this theory, halos over the heads of human figures in prehistoric rock paintings represent helmets of the astronauts' space suits, and miracles described in myths and in the Bible are the observers' naïve reports of the aliens' technological wonders. The ancient astronauts could do the feats, which people of the past (and in all honesty, modern people as well) could associate only with gods: Create human-animal hybrids via genetic engineering, move around huge stone boulders by cancelling the gravitational pull, melt stone by a laser beam, fly in the air and space. At that, the authors of this esoteric theory claim that magic has noting to do with these wonders and all of the "miracles" were the achievements of science that was thousands of years ahead of modern human science. If the omniscient benevolent aliens visited Earth in the past, then there is a hope that they would come back in the future and share with us their knowledge on how to live longer lives and travel into other galaxies and universes.

Those scientists who feel uncomfortable about parapsychology and science fiction and yet reject the idea of God put their faith in *humanism* – the belief in unlimited power of human reason. Humans will save themselves through the unstoppable progress of reason, science and technology. But overcoming all the dangers that await humankind in the future implies the belief in humans' extraordinary powers, thus putting humans in the place of gods. Soviet physicist Nikolai Kardashev introduced the hypothetical classification of civilizations according to the type of energy consumed. Civilizations of the I type use the energy of their planets, civilizations of the II type can utilize the energy of their stars, and civilizations of the III type can employ the energy of their galaxies [36]. By analogy, Michio Kaku classified technical achievements by their degree of impossibility for modern technologies [37]. For instance, he predicts that in a few thousands years it will be possible to overcome the "impossibilities of the II type", by creating spaceships that will fly faster than the speed of light, travelling back in time and getting into other worlds through the "wormholes" that connect different universes. Sir Martin Rees, the UK Royal Astronomer, writes: "Wormholes, extra dimensions, and quantum computers open up speculative scenarios that could transform our entire universe eventually into a 'living cosmos'!" (cited in 37, p. 281). French philosopher and anthropologist Pierre Teilhard de Chardin brought a philosophical basis under the concept of humanism; he directly pointed out to the magical participation between humankind and the cosmos: "In its present state, the world would be unintelligible and the presence in it of reflection would be incomprehensible, unless we supposed there to be a secret complicity between the infinite and the infinitesimal to warm, nourish and sustain to the very end — by dint of chance, contingencies and the exercise of free choice — the consciousness that has emerged between the two. It is upon this complicity that we

must depend. Man is irreplaceable. Therefore, however improbable it might seem, he must reach the goal, not necessarily, doubtless, but infallibly" [10, p.275]. But science fiction and humanism, with all the thrill and optimism of their futuristic prognoses, provide no evidence to support the hope for IS.

To summarize, exploration of paranormal phenomena thus far failed to find convincing evidence that supernatural phenomena really do exist. Surprisingly, some of such evidence cames from an unexpected source – modern physics.

The anthropic principle

According to classical physics, the universe exists independently of humankind. However, discoveries in quantum physics put this view under question. In order to understand how this happened we need to look more closely at what it exactly means - "to exist".

Let us imagine a planet that circles the Sun somewhere at the far end of the solar system and thus far is totally unknown to humans. Does this planet exist or doesn't it? We cannot answer this question until our devices registered this planet or its impacts on the planets that we already know. For instance, the existence of planet Neptune had been predicted on the ground of deviations of the known planet Uranus from its orbit. On the same ground in 1906 it was predicted that there was still another planet that was influencing Uranus' orbit; the unknown planet (called Planet X") was registered on the snapshots only in 1930 and named Pluto [38].

So, what does it mean, "to exist"? In regard to a human person it means two things. First, for a person to exist the person has to be aware of himself or herself. When a person is under general anaesthesia the question or whether he or she exists doesn't

arise. Second, for a person to exist the person has to have memories of his or her past. A person who lost memories of his or her past is a different person; for this person the person who existed prior to the complete loss of memory is dead. The person with no autobiographical memories can restore such memories only by what other people tell him or her, thus relying on beliefs rather than on knowledge.

And what does “to exist” mean in regard to a planet? Modern science teaches us that planets aren't aware of themselves and don’t have autobiographical memories. Even if we tell the planet its past history it won’t be able to understand the story. It turns out that the planet exists only if people know about its existence. Without the people’s knowledge about the planet the planet doesn’t really exist. Philosophes like David Hume [39], George Berkeley [40] and Arthur Shopenhauer [41] pointed out long ago that the world and human representation of the world are tightly connected. Modern psychology confirmed that a human being can interact with the world solely through his or her subjective experiences - sensations and perceptions. Our conscious representations of the world are built on the ground of our sensations and perceptions as well [42]. Contrary to common sense, it appears that without humankind the universe doesn’t really exist.

For a long time physical science resisted this view. Indeed, for instance, don’t the fossils that we find in the ground tell us that tens of millions of years ago dinosaurs roamed Earth, and don’t meteorites that fall from space reveal that before life emerged on Earth our universe was already around 9 billion years old? The problem is however that humankind, like the person who lost his or her autobiographical memory, learns about the past from the facts it observes today. Because we had not observed the universe before humankind came into existence, we have no choice but

to believe what the fossils, meteorites and the light coming from the stars tell us about our past and the past of our universe. But the same facts can be interpreted in a variety of ways. For example, advocates of the "scientific creationism" interpret many facts of geology and palaeontology to provide scientific support for the creation myth described in the Book of Genesis [43]. Perhaps the creationists' interpretation of the facts is not as logical and consistent as the one provided by the theorists of evolution, but it's the difference in the views that matters. The difference between creationists' and evolutionists' views on the same facts shows that we know our past by interpreting the facts we observe in our present. Even in natural sciences interpretation of known facts can change, which alters our theories about the past. For example, quite recently the facts that fossils of the same species of animals and plants were found on different continents separated by oceans were explained by the existence of hypothetical land bridges, which later submerged. It was only when the theory of plate tectonics was developed by Samuel Carey in 1958 that the idea of continental drift (originally put forward by Abraham Ortelius in 1596 and more fully developed by Alfred Wegener in 1912) was finally accepted [44]. As a result, the theory of land bridges was dropped and replaced with the theory that all continents separated from one giant supercontinent Pangaea. Again, contrary to common sense it looks as though we create the past of our planet and the universe using the facts we observe in the present.

The realization of the inseparable link between our knowledge and the way we interpret observable facts gave birth to the "anthropic principle" (see Chapter 4). Introduced by Brandon Carter in 1973 at the Krakow symposium to commemorate the Copernicus' 500 birthday, the anthropic principle was a reaction to the "Copernican principle" [45]. Whereas the Copernican principle states that humans have no a

privileged position in the universe, Carter proposed, "Although our situation is not necessarily *central*, it is inevitably privileged to some extent."[46]. There are two versions of the anthropic principle. According to Weak Anthropic Principle (WAP) the fundamental constants of our universe (e.g., the gravitational constant, the mass of proton, the age of the universe) are such that they make the existence of intelligent observers possible. For example, if our universe were a little younger or older than it is now, life could not emerge because there would be no elements from which living bodies are built. Exactly why in our universe the fundamental constants are just right for making intelligent life possible is usually explained by selection bias, which means that this perfect fit is a random event. But this explanation comes at a price: It means that although our universe is associated with the existence of intelligent observers, this association is only coincidental and partial. For a random event to happen there has to be a pool of variations; on this ground WAP has to accept that our universe is one of many universes, or a part of the multiverse. But most important, from WAP it doesn't follow that the universe didn't exist prior to the emergence of intelligent life and will cease to exist with the end of intelligent life.

In contrast to WAP, Strong Anthropic Principle (SAP) holds that life is not just a consequence of a lucky combination of fundamental physical constants, but that intelligent observers participate in buildung the picture of the universe [47]. As discussed in the previous chapter, according to "Copenhagen interpretation" of quantum mechanics every elementary unit of matter, such as a photon, does not have definite physical properties until it is registered by observation [48]. It means that the observer's mind doesn't simply reflect reality like a mirror reflects a person, but *participates* in the way the reality "condenses" into something definite. In his Participatory Principle, Americal theoretical physicist Wheeler rephrased this thought

as “it from bit” [49]. In essence, this expression suggests that the way a quantum event reveals inself to us depends on the way the observer, via observing devices, asks nature questions, which can only have two answers - “yes” or “no”. An answer to this binary option question is a commonly accepted unit of information, or a “bit”. It is important to note that, in Wheeler’s view, the act of observation does not influence reality; rather, the picture of reality depends the form the observers ask the question: One way of asking the question “provokes” electrons or photons to reveal themselves as particles, and the other way makes the same elementary units of matter “react” as waves [see Chapter 4 for more on that]. Unlike WAP, SAP implies that a human person and the universe are locked in participation; one cannot exist without the other.

To summarise, it follows from SAP that at the level of quantum events supernatural phenomena, such as direct "Self over matter" and participation, are indeed possible. This shows that the belief in the supernatural that most modern people subconsciously hold is not completely ungrounded. However, SAP doesn't imply that the observers' consciousness is immortal. SAP links intelligent observers to the physical universe for as long as both of them exist. Perhaps, the universe is indifferent to its own existence and can perish taking the observers with it in oblivion. Or may be, which is more likely, the observers die and the universe as we know it vanishes with them.

Even so, the hope for immortality of a human mind can survive by clinging to the idea that the individual consciousness does not have to vanish with death of the physical universe but can join some kind of "cosmic consciousness" beyond the physical universe. But this hope runs into the problem of memory. As we know, when a person looses his or her autobiographical memory the person can die before his or her physical death. Because memory is consolidated in the form of engrams (i.e., patterns

of changes in the neurons' synapses of the brain), a halt in the brain functioning also means a complete loss of memory [50]. This means that even if the individual consciousness magically stays after death, this will be the consciousness without memory, and this "memory free' subject would never know who he or she had been prior to the moment of death. This problem can be overcome only if one assumes that apart from being rooted in the brain's engrams, the individual's memory has also a base in some other "storage facility", which is situated beyond the human body, and even beyond the physical universe. With all the extraordinarity of this idea, there are theories that propose the existence of such "out of body" carrier of the individual's autobiographical memory.

Memory beyond the brain

In Plato's dialogue "Meno" [51] Socrates' opponent Meno points out to the "paradox of knowledge" [52]. In essence, the paradox states that in order to inquire into anything you have to already know the properties of what you are looking for, otherwise you cannot recognize the thing you are looking for even if you come across it. But if you know the properties of what you are looking for, then inquiry is unnecessary. On the other hand, if you don't know the properties of what you are looking for, then inquiry is pointless. Therefore, inquiry is either unnecessary or pointless. Looking for a way out of this paradox, Socrates puts forward the theory of "anamnesis" – knowledge as recollection. He assumes that the human soul is immortal and goes through a series of reincarnations. This means that when the soul transmigrates in a new body, it already contains knowledge about the world; however, because of the trauma of birth the soul forgets its knowledge. It therefore turns out that what we usually view as learning is in reality remembering of the already known.

A teacher is not the holder of knowledge, but a person who helps a student to remember the knowledge the student know but forgot. Socrates illustrated his theory by putting questions about a geometrical theorem to an uneducated slave boy. In the beginning it looks like the boy doesn't know the theorem, but gradually, by answering Socrates' questions, the boy comes to the correct answer. This demonstrates, Socrates says, that the boy knew the theorem but was unable to remember it without the leading questions. So, according to Socrates and his follower Plato, knowledge in the form of "universal ideas" is stored not in a person's body, but in a certain depository beyond the body; this theory also implies that when a person dies his or her knowledge doesn't disappear from the world but is stored in this magical depository, together with the person's soul.

Of course, it might require some effort to start believing in the anamnesis theory. Nevertheless, in the second half of the XX century there appeared experimental evidence that seems to confirm this theory. Research has shown that young infants and even newborn babies possess knowledge that they could not possibly acquire through learning. To bring just a few examples, newborns showed the ability to distinguish between canonical geometrical shapes (such as a cross and a circle) [53]; one month old infants could distinguish elastic objects from rigid ones and even transfer this understanding from tactile modality into visual one [54]; at the age of 4 months babies were able to infer that one solid body cannot go through another solid body unimpeded [55], and 15 months old children could predict errors in another person's behaviour if that person's actions were based on his or her false beliefs regarding where a toy had been hidden [56]. How could the babies possibly show these cognitive skills if they hadn't have an opportunity to learn them through experience?

One might assume that these cognitive skills are innate and transmitted through genes. But this interpretation is unlikely, because genes can carry only a very limited amount of information. The scientists' early hope that genetic code can exhaustively explain the forming of an individual organism did not come true. As British specialist on molecular genetics Rupert Sheldrake writes, genes code linear sequences of amino acids in proteins, which still have to fold into complex 3-dimensional forms. "Even if the protein-folding problem could be solved, - he continues - the next stage would be to attempt to predict the structures of cells on the basis of the interactions of hundreds of millions of proteins and other molecules, unleashing a vast combinatorial explosion, with more possible arrangements than all the atoms in the universe" [57, p.173].

In order to explain the process of the formation of cells, tissues and organs, Sheldrake introduced the concept "morphic field" – a special non-physical formation that "tells" the cell to which organ of the body (e.g., a hand or a leg) the cell belongs and what functions it performs. The author illustrates the relationships between the morphic field and genes by the relationships between a TV program we are watching and technical structure of a TV set. The image on the TV screen is impossible to have without a complex technical scheme of transistors and electronic circuits that compose the TV body, but the image is not created by this technical body. The image is created by electromagnetic waves that are captured by the TV body and transformed into the image on the screen. In biology the morphic field plays the role of electromagnetic waves: It contains the "program" of an organism, whereas genes (the parallel to the TV set) convert this program into the whole organism. If a transistor is broken in the TV set, this may cause a defect in the image on the screen. In a similar way, a defect in a genetic scheme (e.g., a mutation) can cause a defect in

the structure and behaviour of the organism. But this doesn't mean that the organism is directly determined by the combination of genes. Genetic mutations change the "tuning of the aerial" of the genes which start to "catch" a wrong program from the database contained in the morphic field: For instance, a fruit fly (Drosophila melanogaster) may grow a second (and useless for its ability to fly) pair of wings. Although the author doesn't associate the concept of morphic field with the supernatural, such interpretation is possible, considering that in his opinion morphic fields cannot be "reduced to standard chemistry and physics" [ibid, p.173].

Sheldrake assumes that nature possesses "inner creativity" and "inner memory". He maintains that the laws of nature are not given from the outset but develop gradually like habits in humans and animals. For instance, new chemical substances develop spontaneously, like the known laws of physics developed soon after the Big Bang, but then these new substances begin to facilitate the emergence of the same substances at a distance, through a mechanism the author calls "morphic resonance". If on some planets in the universe a certain chemical compound already existed, then the synthesis of this compound on Earth would be faster and easier to achieve than a synthesis of a completely new compound that had never been present in the universe. The scientist brings a variety of facts in support of his hypothesis. For example, crystallization of new chemical substances that once was achieved in a certain laboratory makes similar crystallization in an independent laboratory at another part of the globe more easily achievable, without any "know how" exchange between these laboratories. From the perspective presented in this book, the morphic resonance is a case of magical sympathy: The influence of an event on a similar event at an arbitrary distance, both in time and in space, and not through any of the known fundamental forces of nature.

But if nature has its own memory, then it should be able not only to remember but also to forget. In humans, skills not only can be acquired but can also die out (e.g., if a piano player or a sportsman doesn't practice for a long time, his or her quality of performance goes down). Similarly, one can expect that some of the regularities in nature can diminish and even disappear. Confirmation of this hypothesis can be seen in the unexplainable gradual decrease of the reproducibility of experimental phenomena in psychology and other sciences, known as the "decline effect". In the 1930-th American parapsychologist Joseph Banks Rhine found that in some of his participants their abilities to correctly guess other peoples' thoughts were fading until they disappeared completely [58]. Later a similar decline effect was observed in other branches of psychology. In 1990, American psychologist Jonathan Schooler reported the "verbal overshadowing" phenomenon. According to this phenomenon, under some situations putting non-verbalizable thoughts into words can be disruptive: Participants' recognized objects they had seen and named worse than the objects they had seen but didn't name [59]. However, with years the scientist found it increasingly difficult to replicate this effect. Looking for an explanation, he writes: "Perhaps, just as the act of observation has been suggested to affect quantum measurements, scientific observation could subtly change some scientific effects. Although the laws of reality are usually understood to be immutable, some physicists …. have observed that this should be considered an assumption, not a foregone conclusion" [60, p. 437]. In private, the author sometimes called the decline effect "cosmic habituation" [61]. When we conduct a scientific experiment, we ask nature a question and expect a standard answer every time we repeat this question under the same experimental conditions. In science this repeated emergence of standard answers is called "replicability". Yet it turns out that however hard scientists try to maintain the exactly

same experimental conditions, the nature's answers eventually fade. It's as if nature "habituates" to stimuli that are always there. In living organisms habituation is when an organism gradually stops reacting to a stimulus that happens repeatedly. To put it in other words, nature reacts like a living creature – it gradually "forgets" its own answer. Later a similar decline effect was found in other sciences, such as biology and pharmaceutics. For instance, drugs that used to provide a high therapeutic effect with years were loosing their therapeutic power, even though patients took them who had never used them before [ibid].

So, there are some grounds to assume that both autobiographical memory of a human individual and the "memory of the universe" (e.g., the laws of nature) can be stored in a certain hypothetical depository, which is beyond the physical universe. Throughout history, scientists gave different names to this depository, such as "the *realm of ideas"*, or "the *morphic field"*. The "depository hypothesis" doesn't replace the traditional explanation of human memory by synaptic engrams but rather complements this explanation. If this hypothesis is taken seriously, then the implicit hope for the immortality of an individual human consciousness, and the humankind for that matter, is not without some grounds after all. And still, it remains only a hope.

A person in the ocean of time: Conclusions

We started this chapter with the question of the psychological causes of the phenomenon of "cosmic thinking", when renowned scientists and even institutions engage in projects that seem to have no practical value in the modern life. These projects include exploration of problems such as the origin of the universe, the future of Earth and the universe in billions of years from now, the structure of objects that are situated hundreds of millions of light years away from the Milky Way or are so

fundamental that can exist only in theory, and the fate of humankind in the future measured on a cosmic scale. These studies require serious investments. At that human civilization exists only a few thousand years, is facing a number of urgent challenges (such as on-going regional wars, refugee crises, global warming, undernourishment, lethal diseases, overpopulation, and ecological disasters), and can come to its abrupt end at any moment from a variety of lethal impacts. We hypothesized that the acute interest in global cosmic issues has its basis in the subconscious hope of modern people that a person's mind, and humankind, are immortal.

The historical analysis revealed that the hope for IS was rooted in the belief of the ancients in the supernatural realm where gods and spirits lived and where after people's death their souls passed. Modern science proclaimed that the belief in the supernatural is a fallacy, and this imposed a ban on the hope for personal immortality.

Nevertheless, psychological research in the recent decades has shown that the belief in the supernatural is alive not only in small children and superstitious adults, but in the majority of educated adults who consciously view themselves as non-believers in magic or in god. The research also supported the notion that the belief in magic is accompanied by the belief in the IS. These results suggested a possible explanation of the phenomenon of cosmic thinking: In their subconscious, modern people belief in the supernatural, and this belief gives a person the subconscious hope that the individual human consciousness, and the humankind, could be immortal.

We reviewed various attempts people made to provide their implicit belief in the supernatural with evidence: Studies of paranormal phenomena, exploration of the possibility of participation between a person and the universe (e.g., the “effect of Mars”, the direct effect of thoughts on matter, the near dearth experiences), creating

quasi-scientific theories (e.g., the “ancient astronauts” theory), and developing humanistic approaches (e.g., the “omega point” theory). We came to the conclusion that none of these attempts provided solid evidence for the supernatural phenomena, which leaves the implicit hope for personal immortality without support. In contrast to the aforementioned attempts to prove the existence of the supernatural, the achievements of quantum physics showed that at the level of quantum events the magical participation between human consciousness and the physical universe is indeed a reality. These achievements were summarised in the strong anthropic principle (SAP). But SAP does not guarantee immortality of the humankind, as it links the physical universe to intelligent observers for only as long as the observers live.

Finally, we examined the assumption that the mind can survive death of the physical universe by joining the cosmic consciousness. We found that despite some evidence for the possibility that both human memory and memory of the universe are stored in a depository beyond the physical universe, this assumption remains mostly hypothetical.

And yet, the hope for immortality lives on and keeps providing inspiration for scientific and non-scientific studies. Why is it the case? Because a hope takes its strength not from knowledge, but from passion and belief. And most people passionately want to live in eternity and, subconsciously, believe in the supernatural. This subconscious belief feeds the rational people's hope for personal immortality.

A lonely traveller on a yacht in the middle of a boundless water desert – this is my image of a person, at the dusk of his or her earthly journey, who firmly believes in science and is already unable to accept a common religious faith. Joys of discoveries

of childhood, aspirations of youth, confident steps and achievements of adulthood – all of this is behind. And what is ahead? Almost nothing, on the honest rating. Of course, there are still remains of the health in the body, canned food in the storage, fresh water in the cistern, and the yacht is still on the float… But in the mist that lies ahead the inevitable moment is already visible when the journey will come to its end. And still, something elusive and subconscious glimmers in the darkness – the little ray of hope. The hope that the omniscient being is looking at you and is ready to open their embrace to you, selflessly and unconditionally. The hope that your life was not just a splash on the boundless surface of the ocean of time, and your deeds – both good and bad – will be appreciated in eternity. For a nonreligious person this hope has no scientific and logical grounds. A person like that understands that by his or her conscious disbelief in god and the supernatural he or she does not deserve this hope. And still, the hope is there. Locked in the dungeon of subconscious, this hope feeds endeavours that from a rational point of view are impractical and initiates inquiries in issues that are beyond our understanding. Against all odds, we live as if our soul is immortal.

But life itself is against all odds. There is no ground for a system of such complexity as a human organism to exist and not to fall apart at any time, yet this system lasts. There is no ground a person to be kind to others, yet some people are kind. And it seems to me that this hidden, subconscious and “unlawful” for a rational person belief that life and the mind are irreducible to the laws of nature, that there is something bigger than what a person and even the humankind can possibly comprehend, that the supernatural is not a fallacy but a reality – is the feeding ground for the person’s last hope: The hope for immortality of the soul.

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Chapter 6. Religion and the Belief in the Supernatural

Abstract

Is there any scientific proof of god's existence? Can one live without believing in anything? How can the traditional belief in god, the belief in magic and the belief in science coexist in one mind? The analysis revealed that the belief in the supernatural appears in early humans as a result of the convergence of two factors: The development of the imagination, and the awareness of the inevitability of death. The awareness that each person is destined to die triggered the powerful feeling of frustration, which turned the imagination on, thus giving birth to the idea of afterlife. Spirits of dead ancestors, which populated the invisible world of the afterlife, became the first gods. Monotheistic religions grew out of magic yet maintained a link with magic through the belief in supernatural beings and miracles. Science opposed both religion and magic but was unable to replace them. Recent studies in science, neuroscience and parapsychology suggest that supernatural phenomena do really exist. There is a chance that in the future science, religion and magic will be

converging, thus opening new opportunities for handling the supernatural phenomena. Functions that the belief in the supernatural plays in everyday life are also discussed.

Problem

> Life has no meaning the moment you lose the illusion of being eternal.
>
> Jean-Paul Sartre [1]

Moscow, January 11, 2014. It is bitterly cold. The immensely long line of people is entering the Cathedral of Christ the Saviour, to venerate the Gift of the Magi brought from Greece for a few days. The loudspeakers in the underground stations ask people to delay their visit to the Cathedral due to overcrowdedness, but in vain. The Gift is shown on the TV: this is a small metallic casket incrusted with precious stones and with some image inside. By the never ending flow people approach the casket, kiss it or touch with their foreheads, cheeks, hands or small icons. A reporter interviews some of the pilgrims. Many arrived from remote corners of Russia. All of them hope for a miracle: Healing from diseases, happiness for themselves and family. According to legend this relic exists since the time of Christ. Like other relics, the Gift of the Magi is a gate linking the real world with the world of the supernatural - with god and angels. Perhaps, 30 thousand years ago, in the time of the Upper Palaeolithic, under the flickering light of burning pine branches people touched the Spirit of the Great Deer pictured on the wall of a cave, asking the spirit to give them luck in hunting. After tens of millennia the cave became the Cathedral clad in marble, and the image painted in ochre on the cave wall turned into the precious piece of jewellery, but

human beings remain the same, with their pains and desires, love, hope and the belief in the world that is invisible but can see them and help them if properly asked.

One day roaming YouTube I came across a talk by Richard Dawkins - a militant atheist. Someone from the audience asked him why he was so sure that God didn't exist. Because – he answered, - there is no evidence whatsoever of god's existence. And a thought crossed my mind – a citation from the early Christian author Tertullian (155-240 AD), who wrote, "I believe because it is absurd" [2]. Unlike Dawkins, Tertullian didn't think that the belief in God's existence should be based on evidence. Indeed, if there were evidence of god's existence, the belief in god would not be necessary. Although we often say, "I believe in what I see with my own eyes", we don't really need to believe in something we have available in perceptual experience. For instance, knowledge about the law of gravitation is supported by our perception of weight, which provides us with evidence convincing enough to render the belief unnecessary. If someone became doubting this law, the doubt would fast dissipate as soon as the person jumps from a chair and tries to fly in the air. Belief is different from knowledge. For the belief, we need to imagine something that we can't possibly have in perception, and invest this something with existence by the sheer effort of will. But in order to make ourselves to go for such an energy consuming effort of will, we need to have a really solid reason.

But are atheists right, and there is no evidence of gods existence whatsoever? Can one live without any beliefs at all and rely only on scientific proof? Can traditional religious beliefs, the belief in science and the belief in magic coexist in the mind of one person? Let's find out whether the recent research on magical thinking in modern people can help us answer these questions.

The discovery of the world of spirits

A vast herd of wildebeests slowly moves under the burning sun on the dry African plane. For many days, without water and food, crossing crocodile infested rivers, the animals move out of the drought zone toward the zone with the abundance of green grass. Predators, which are territorial and stay in the drought zone, are hungry and thirsty as well; yet have to wait patiently for return of the herds. But neither the herbivores nor the predators try to pray to gods for the desperately wanted rain. Humans are the only animal species, which invented a prayer and a ritual – the ways of affecting nature by thoughts and symbolic actions. The belief that thoughts, words and rituals can directly affect natural processes and inanimate objects is the key feature of the belief in magic. This belief was also the first form of religion.

When did this belief begin? Some anthropologists associate the belief in magic with the neocortex, which evolved around 500 thousand years ago and occupies a notable proportion of the human brain. The neocortex opened the possibility for new cognitive skills to develop, which were necessary for the emergence of consciousness, language and religion [3]. Anthropologist Pascal Boyer suggested that the basis for the emergence of religion was laid down by the evolvement of such cognitive skills as attribution of activity to natural processes, attribution of consciousness to animals and inanimate objects, and some others. "When we see branches moving in a tree or when we hear an unexpected sound behind us, we immediately infer that some agent is the cause of this salient event. We can do that without any specific description of what the agent actually is" – he writes [4, p.144].

One can hardly argue against the idea that the belief in the invisible agents that are hidden in rivers, boulders, trees and animals requires a complex brain and advanced

cognitive skills. The question, however, is whether having the complex brain and advanced cognitive skills was sufficient for humans to develop the idea of the invisible agents? The precursors of such cognitive skills exist in apes and other animal species, but the animals did not invent a religion. There is a fundamental difference between *danger escaping behaviours based on detecting movements and sounds in the environment,* and the animistic belief in that *behind these movements and sounds some invisible agents pull the strings*. Danger escaping behaviours can be either hardwired in the animal brains by evolution (and then they are called instincts) or learned through experience (conditioned reflexes), but they are not based on beliefs. In order to believe in invisible agents, spirits and gods, people had to first develop the idea of what a spirit is. In other words, cognitive skills, however complex and advanced, are nothing but intellectual tools, just like a stone axe or a knife. But the idea of an agent or a spirit is an abstract notion that required a leap from the world of perceptual experience into the invisible world of abstract thinking. A leap like that needs two things: Powerful imagination and a strong emotional experience of some kind.

As argued in Chapter 2, the emotional experience that triggered the invention of the concept of a spirit was the realization of personal death. Dreams and hallucinations could be an additional factor that helped to develop the notion of a spirit. In their night dreams, people had experiences that differed from those they had in a waking state of mind: They could fly in the air, go through hard walls, and speak with their deceased relatives. These experiences too may have contributed toward the idea that in a person's body an entity lives that can go out of the body and wonder around while the person is asleep. Taking this possibility on board, British anthropologist Eduard Taylor maintained that ancients wrongly took their dreams for reality. This

"error of judgement" created the belief in the invisible world of spirits [5]. What is missing in Taylor's account is that in order to make this error of judgement, people had to first notice that they have dreams. Neurological studies suggest that some animal species have dreams [6], but animals are unlikely to ponder their dreams. Pondering ones dreams requires reflective thinking – looking at dreams, which are not currently present but need to be recalled, from the perspective of a waking state of mind. Making the leap from the perceptual world of the present into the invisible past required a push by some powerful emotional experience. The shock at the realization of inevitability of personal death may have been such a push. Having invented the idea of spirits of the dead, people could assume that living persons too have spirits inside their bodies, and these spirits travel outside their bodies in their dreams.

In sum, the discovery of the magical world of spirits was triggered not by the intuitive cognitive skills and logical inferences, but by the powerful desire to live and the fear of death. In modern people the longing for staying alive and the fear of death are still there. But today, due to the achievements of science and medicine, people live longer and are less dependable of unpredictable circumstances of life. Many educated rational adults reason that magic and god are concepts from the genre of fantasy and don't really exist. But do they really believe this?

Belief in the supernatural

For a child brought up in a religious family, the belief in the supernatural comes from his or her social environment. The child absorbs the parents' religious views and rarely doubts them. In a similar way, adult religious believers seek support of their faith in their coreligionists. Psychological experiments have shown that for most people even the belief in science, just like the belief in god or in magic, is based not

on independent experimentation and critical thinking, but on the support of their trusted social groups. For example, in one experiment educated adult participants (university undergraduates and staff members) were individually shown an empty wooden box, asked to place a brand new plastic card in it and close the lid of the box [7]. Next, the experimenter chanted a magic spell intended to damage the object in the box. The participants were then asked whether they believed the object in the box had changed; most of them answered that they didn't. The participants were instructed to open the box and remove the card. They were surprised to see that the card now had engravings on it as if done by a sharp instrument. The participants were encouraged to examine the box for a false bottom and other hidden compartments, and found nothing. Despite the absence of a rational explanation, most of the participants denied that the card had been damaged by the magic spell. They argued that changing physical objects by just saying words is in contradiction with the laws of physics. Next, the experimenter asked the participants to put their hands in the box and said that he did not guarantee the safety of their hands if he said his magic spell again. This manipulation aimed at removing the implicit assumption that the laws of physics are untouchable. The experimenter also asked the participants to give a written consent that they would not blame the experimenter for whatever happens to their hands after he says his magic spell. This was done in order to remove the participants' feeling that the safety of their hands is being guarded by the conventional moral rule of not hurting the participant during the experiment. The participants now understood that their belief in that a magic spell could not possibly hurt their hands was no longer ensured by social conventions and hung on their personal courage. When under these circumstances the experimenter asked the participants' permission to repeat his magic spell, half of the participants denied the permission and explained their decision by

their belief that the spell might indeed damage their hands. This showed that *removing the implicit social support of the belief in that the laws of physics are invincible made educated adult participants abandon this belief and admit that they actually believe in magic*, both in their verbal judgments and in their behavioural reactions. In subsequent experiments when participants had to put under risk not their hands but their future lives, up to 90% of participants acknowledged that magic could indeed work [8].

It is noteworthy that British educated participants showed a greater disbelief in magic than uneducated peasants in rural villages of central Mexico only when the implicit social support of this disbelief was provided. However, when this social support was removed, British participants exhibited their belief in magic to approximately the same extent as Mexican participants [9]. These data explain why in the ancient world, in Medieval Europe and even in the time of Renaissance, when the belief in magic was supported by dominant social ideology, this belief was overwhelming. It is only because of the phenomenal success of science in the last four centuries that the dominant social ideology changed and the belief in science took over. Yet the aforementioned experiments revealed that modern rational adults, who consciously deny their belief in magic, subconsciously still harbour this belief. The question arises of why is the belief in the supernatural able to withstand the pressure of scientific education? And why religion is still there? Could it not be because there is yet some evidence of the existence of god and the supernatural?

Evidence for the supernatural

Paradoxically, the idea of the existence of a supernatural omnipotent intelligence comes from science itself. We know that mathematics and logic operate “borderline

concepts", such as "infinity". But how could people possibly acquire such concepts and use these concepts in scientific research? Certainly, they could not learn the infinity concept from experience, since in experience we only see something finite. For example, when we think of the concept "a bird", we can show a real bird flying in the sky in support of this concept. When we think of a mathematical concept, for example, of "number 7" or a triangle, we can point out to a set of seven apples or a triangular shaped facet of a crystal. By contrast, when it goes about the borderline concepts, such as infinity, there is nothing out there to show in support of it. It is impossible to see the real life infinity; the concept of infinity can only be represented as a symbol ∞. But we know that infinity is not just a symbol, it does really exist, because if it didn't, we wouldn't know about it. Of course, there may be other characters that are only imaginary and don't have referents in the real world, such as mythological creatures (e.g., Minotaur – a creature half like a man and half like a bull), but these characters are still based on our experience – seeing a man and a bull, and simply putting parts of these creatures together in the imagination. Not so with infinity. Infinity couldn't originate in the human mind, since the human mind is only capable of making a finite (and not very large) number of operations. Even the most powerful quantum computers would be able to complete the "almost infinite", yet still a limited number of operations. The infinity cannot exist in the physical universe itself, as the infinity is an infinite sum of mental operations, like the sum of an infinite set of real numbers, and the physical universe is devoid of any mentality. We have to admit on this ground that infinity exists within some kind of omnipowerful mind – the mind of god – who simply shared his knowledge with us.

Usually, scientists are not bothered by this philosophical problem; they simply use the infinity concept to find solutions of many theoretical and practical problems. But the

effectiveness of the borderline concepts is the indirect proof that the "holder" of these prototypes – god - exists as well. Of course, this "god of science and philosophy" isn't exactly like the gods of the ancients and even like the god of modern religions, yet there are some similarities. The god of science has the mind that is infinitely more powerful that the human mind. Some philosophers argue that we will never be able to understand the mind of god [10][11]. But one doesn't have to understand the mind of god in order to know that the god exists.

Another kind of evidence for the existence of the supernatural comes not from theoretical considerations, but from phenomena that cannot be explained by science. The Big Bang that brought the universe into being, the presence of the enigmatic creative force in the universe that builds complex systems out of the simple ones, dark energy and dark matter, the emergence of life from non animate matter, the emergence of consciousness and free will – these and some other phenomena thus far escape scientific understanding. Of course, science will keep trying to reach a better understanding of such phenomena, but it is unlikely that science will ever be able to fully explain them. And this means that there is a mysterious "point of creation" within or outside the universe, which is beyond reach of the human capacity of rational understanding.

But let's come back to the point in the early prehistory when the belief in the supernatural was discovered. People discovered the fact of their mortality. This discovery brought them to the idea of the afterlife and the notion of a spirit or an agent. The invisible world of spirits expanded to include living humans, animals, plants and inanimate objects. The whole world began to be viewed as full of agents and spirits. The power of the gods expanded from looking after the living tribesmen to

commanding the elements – the air, water and fire. Still later, in monotheistic religions a single god became the maker of the world; from being a god of only one people, he became a god for all people on earth. Eventually, the view of the world changed as well: The scope of entities with the spirits inside shrunk to include only god, people and, arguably, animals. There appeared a vast area of spiritless objects governed by unchangeable and universal laws. Physical science emerged, and other natural sciences that model themselves on physical science. Science, technology and medicine undermined the leading role of religion in modern industrial cultures, and ousted the belief in magic into the realm of subconscious. But science failed to completely replace people's belief in the supernatural.

The question arises of why didn't the belief in the supernatural disappear entirely in the course of historical development, like disappeared many beliefs, such as the beliefs in mythical titans and in that the Earth is flat? The aforementioned evidence for the existence of god is mostly theoretical and is unlikely to prevent most people from abandoning the belief in magic and in god. So, why did beliefs in the supernatural survive? A possible answer is: *Because these beliefs serve people's needs, which cannot be served by science.* In particular, the possibility to address gods through prayers and rituals helps people reduce the fear of death and suffering, thus increasing the people's chances for survival. In psychology this psychotherapeutic function of the belief in the supernatural is called "the illusion of control".

The illusion of control

Psychological experiments have shown that people feel more confident and act more effectively if they believe that they are in control over the situation than if they think that the situation doesn't depend on their actions. For example, in one experiment a

group of participants was allowed to choose their lottery tickets; another group of participants received lottery tickets chosen for them by someone else. Although both groups had equal chances to win the prize, participants of the first group assessed their chances higher and were inclined to swap their tickets for different ones to a lesser extent than participants of the second group [12]. In another experiment participants were instructed to watch a basketball player throwing a ball into the basket. Those participants who had been trying to visualize successful throws and thus "help" the player to score did indeed think that the player's successes were achieved partly due to their imaginary "help", despite the participants' realization that their imagination could not possibly affect the player's actions [13]. One can assume on this ground that a petitionary prayer and other ritualistic pleas to gods play a similar role: They create in people an illusion of control over those situations of their lives, which in reality are out of their control.

Indeed, why do many people are so eager to look into their future by addressing oracles and other fortune-tellers? Logical reasoning should have told the people that if something were written into their fates then it would happen to them independently of whether they know or don't know their fates. Yet people keep trying to learn their fates. In ancient Rome no serious actions (like going to a war or laying the foundation of a major building) were taken without asking the fortune-tellers and studying the omens. Even the decision to convert to Christianity was taken by the emperor Constantine because of the omen he had seen before a battle. Today people are less superstitious, yet fortune telling is still a popular profession. In the media and on the web a small army of fortune-tellers predicts actions of terror, earthquakes, tsunamis, and other disasters. What can science do to oppose this mania of prophesizing? This is not a realm for science. Even religion prefers not to intervene. As a result, the niche of

Nostradamus is up for grabs, and there is no shortage of candidates. So, why do rational people seek to know their fates?

The “illusion of control” phenomenon might suggest an answer. People want to know their fates in order to feel they are in control over them. They understand of course that their attempts to change fate are futile and illusory, and yet this illusion has a soothing psychotherapeutic effect. In his poem “The Song of Wise Oleg” Russian poet Alexander Pushkin brings us an example. Prince Oleg asked a fortune-teller of when and why he would die. The fortune-teller prophesized that Oleg would take death from his favourite horse. Oleg was sceptical about the prophecy yet he replaced his favourite horse with another one. Many years passed, Oleg successfully fought and won many battles. One day Oleg enquired about the fate of his favourite horse and was told that the stallion has long been dead. Oleg mocked the false prophecy and decided to visit the horse’s grave. When he put his foot on the horse’s skull, a poisonous snake crawled out of the skull and bit Oleg. Oleg died, the prophecy came true. Oleg’s attempt to cheat fate failed – and yet it was not entirely meaningless. Let’s imagine that Oleg did not change his horse. In any battle he would have been worried that the stallion is destined to bring him death, and this anxiety may have distracted Oleg, diminished his courage in the battle and even cost him his life. Changing the horse increased Oleg’s confidence and supported his military spirit. It didn’t matter that in the end the prophecy came true. What matters is that the illusion of having cheated the fate gave Oleg a very real advantage: Courage and self-confidence in battles.

For the believers in god, religion provides the feeling of control. Through prayer and confession, our sins can be obliterated; for a religious person, even death can be taken

under control, for there is a hope of resurrection. For those who don't believe in god, everyday superstitions perform a similar function of creating the illusion of control. By crossing our fingers or knocking on wood we make ourselves calm, as if pacifying the evil forces and soliciting help of our guardian angels. We know that these actions are nothing but a superstition, and yet these magical actions help. It is no coincidence that people of most dangerous professions (pilots, construction workers, sportsmen) are also the most superstitious ones [14]. Where the results are unpredictable and stakes are great, science cannot help. All what remains is to rely on the supernatural, even if a person does not believe in it. More so if he or she does.

But why do so many people today regress to the level of ancient magic, instead of going with religion? – a reader may ask.

Magic and religion

As argued in the previous chapters, initially magic and religion were the same. People believed in ancestral spirits and animal spirits and those were their gods. Eventually in great civilisations, like ancient Egypt, Greece and Rome, gods acquired more diverse and clear forms. But along with main gods there always existed a multiplicity of little gods and goddesses of the second rank, with which people communicated by means of magical rites. With the onset of monotheism, tension developed between dominant religions (e.g., Judaism or Christianity) and magic, for they started compete for the people's minds.

Indeed, the Bible condemns magic. "Never let a witch live" (Exodus, 22:18) is just one of many places in the Old Testament where magic is ostracized. And yet both the Old and the New Testaments are full of miracles. In the Old Testament, God creates

the universe, including plants, animals and humans (Genesis, Chapters 1-2); God sends the Great Deluge (Genesis, Chapters 7-8); at Tower of Babel men's single language changes to many (Genesis, 11; 1-9); the sin cities Sodom and Gomorra are destroyed by the heavenly fire (Genesis, 19:24); the wife of Lot becomes a salt pillar (Genesis, 19:26); Aaron's rod is turned into a serpent (Exodus, 7:12); and around 100 more. In John's gospel at a wedding in Cana water is turned into wine (2:1-11); a royal official's son is miraculously healed (4:46-54); during the Fall festival in Jerusalem a man is healed of a 38 years infirmity (5:1-9); Jesus heals a man born blind (9:1-7); Lazarus is resurrected after being dead for three days (11:38-44). In Matthew's gospel Jesus casts demons out of people with a word, finally, Jesus himself is resurrected from the dead.

So, the Bible doesn't deny that magic and miracles do really exist. Even today, the Catholic Church believes that during Eucharistic Celebration the sacrificial bread and wine become the body and blood of Christ, through consecration by a priest. In this rite, bread and wine do not simply symbolise the flesh and blood of Christ, but undergo *transubstantiation* – the magical conversion of the invisible substance of the bread and wine – into the flesh and blood, while the sensual appearances of the bread and wine remain unchanged [15]. From the historical perspective it isn't surprising: It is impossible to cut the umbilical cord that links religion to it's mother – magic – without spilling some blood in the form of miracles. From the psychological perspective, the Bible needs miracles to be convincing in the eyes of believers. Without miracles, the Bible would not differ from an ordinary, and rather messy, description of historical events and historical anecdotes, and God Almighty and his representatives on Earth would not be able to inspire awe and enjoy the unconditional trust of people. It appears that in the view of the Bible's authors doing miracles as

such is not a sin; a sin is when a person is trying to do miracles without the help of god. Considering that believing in magic is believing in spirits that live in the things of nature, doing magic without the god's authorization means making a pact with the little spirits, while skipping to ask the permission of the supreme spirit – god – at the same time. Because priests represent god on earth, doing magic also undermines the priests' authority. It is unacceptable for the Church to share magical powers with commoners; doing this could diminish the priests' psychological influence over the people.

As a result, magic split into two categories: High magic and law magic. Initially the belief in magical reality was the way of overcoming the fear of death and anchoring the person's existence, which is full of sufferings and unpredictable dangers, in the everlasting world of the spirits. Magical communication with gods pursued fairly practical goals: People asked spirits to give them luck at hunting, crop growing or war. With time, in monotheistic cultures this role was taken by official religions, and the remaining part of magic turned into illegal "direct deals" with little spirits. Many of those who come to practicing witches believe in god, but they see god as a powerful wizard of some sort, who is high above and hard to reach. By contrast, the "little spirits" look more accessible partners in business; they are less strict and could be bribed. Even within the realm of main religions in people's daily life the "high" and "law" requests for miracles are erratically intertwined. Official religious ceremonies on Christmas and Easter are one thing, but in daily life people ask god for simple and mundane favours. Recently I visited a monastery near Moscow. The monastery's role as a place of worship is accompanied with a set of practical activities, such as selling soft drinks, cakes, calendars and icons. In the cathedral people habitually cross themselves in front of the icons, fire the candles, and queue

for the holy water; hands and legs of a monument of the saint who is buried in the monastery's cemetery are polished to shining by touches of thousands of believers who seek the benevolence of divine forces. Magical rituals on this ground are as mundane as consuming tasty cakes stuffed with cabbage.

And yet, in industrial cultures the number of people grows that do not belong to any established religion. A number of factors may have contributed toward the growing secularisation of industrial societies. As argued above, one of the factors was the success of science, which made a human life safer and longer. Another factor is the stiff nature of religion itself. Mainstream religions, like Christianity, are based on certain fundamental assumptions (e.g., the Immaculate conception of the Virgin Mary, the resurrection of Christ after death), which for many modern educated individuals are hard to comprehend and accept. At the same time, modern Church is reluctant to accept real supernatural phenomena, such as parapsychological effects, on the ground that such phenomena may be inspired by dark forces. Finally, the abundance of grief and unhappiness in the world, the observation that the evil is not always punished but often is rewarded, come in contradiction with the image of God as a kind and benevolent entity. All of this diverts many people from the established Church.

Does this mean that these people live without beliefs at all? Or is it more likely that when the energy of the belief in the supernatural is left without its main target - god, it finds a replacement. The new target could even be the theory that the belief in god is harmful and dangerous for people. There are atheists who fight religion with the zeal of a religious extremist, as if god himself confirmed their disbelief in god. More often however, the disappointment in mainstream religions makes people search for

alternative ways of dealing with the supernatural. One of these ways is applying to traditional magic and superstitions, and another is *rational mysticism*.

The belief "from the reason"

In one of his books American psychologist William James (1842-1910) described unusual sensations he had experienced after taking in *chloral hydrate* and other hallucinogenic drugs [16]. Although James was a hard believer in scientific method in psychology, he nevertheless admitted that mystical experience could be a reality. In his view, mystical experience allowed a person in certain moments of life to switch to the "upper reality" – to the "mind of god". Like James, some modern researchers believe that one way to achieve such altered state of consciousness is by taking psychedelic substances.

In 1954 English writer Aldous Huxley reported his experiences after taking mescaline – a psychedelic drug obtained from cactus Peyote [17]. Huxley revealed that he had had the experience of oneness with higher reality, which subsequently positively affected his life by broadening his consciousness and increasing his interest in life. In order to verify Huxley's report, in 1962 psychiatrist and theologist Walter Pahnke conducted and experiment in Harvard University, which became known as the "Good Friday Experiment" [18]. Participants (university undergraduates) were divided in two groups. In the experimental group participants received a pill of psilocybin (the active principle in psilocybin mushrooms) that produces altered states of consciousness, and the control group received an "active placebo" - a dose of niacin that produces some physiological changes but doesn't affect consciousness. The participants were asked to describe their experiences and assess the strength of those experiences twice: Immediately after the session, which lasted for a few hours, and six months later.

Participants who received psilocybin, but not the control group, reported profound mystical experiences, such as the feeling of oneness with the surrounding objects, of the divinity and uniqueness of each object, of the impossibility to put their experiences into words, and of the loss of awareness of their location in space and time. Six months later the participants acknowledged that the mystical experience had a positive effect on their lives: It made their religious beliefs more profound, intensified their feelings of compassion and love to others, and sharpened their perception of the beauty of life. This experiment was taken by many as a proof that an artificial intrusion in brain chemistry can produce mystical experiences similar to those achieved by traditional meditation practices, such as a prayer, concentration or long fasting. However, not everyone agreed.

Harvard university graduate Rick Doblin interviewed the participants of this experiment in 25 years after the experiment and found that along with the positive experiences they also had had negative ones, such as the feelings of fear, anxiety and concern that they were going mad. One of the participants who had taken psilocybin fell into the state of paranoia, rushed out in the street and started to proselytize the coming of the age of the global peace. Even after 25 years this participant occasionally felt fits of unaccountable anxiety. In other words, mystical experiences induced by psychedelic substances can be both positive and negative. Philosopher Steven Katz considers mystical experiences achieved by taking drugs as false. In his view the drug induced experiences are nothing but a reflection of noises in the brain of a person who took the drug, whereas meditation, yoga and prayer could indeed bring the person in contact with the higher reality [19].

With the aim of studying this issue in depth American radiologist Newberg and psychiatrist D'Aquili used the method of photon emission tomography to explore the brain activity of people who were at the peak of meditative states [20]. They discovered that when people are immersed in a deep meditative state and experience the feeling of oneness with the universe their prefrontal cortex becomes hyper activated, which leads to the inhibition of neural activity in parts of the parietal lobes. Newberg and D'Aquili hypothesized that it is the inhibition of the brain activity in the parietal lobes that causes some of the characteristic phenomenological features of mystical experiences. They assumed that with the development of new advanced technologies of registering brain activity it would be possible to experimentally determine whether the mystical experience is genuine, or results from pathological conditions, like hallucinations in schizophrenic patients. The authors sited studies which had showed that having genuine mystical experience positively affected people's lives by increasing the people's self-esteem, improving interpersonal relationships, decreasing anxieties and enhancing the ability to feel compassion to other people [21]. However, further research revealed that mystical experiences initiated by psychedelic substances could also lead to the growth in narcissism, fanaticism and hatred.

If Newberg and D'Aquili thought that that they had found the brain localization of one particular kind of mystical experience – the feeling of oneness with the universe, then Canadian psychologist Michael Persinger claimed that he had found localization of all kinds of mystical experience, including the belief in god [22]. He reported that many of his patients with brain trauma had experienced the feeling of some kind of ethereal presence, as if someone invisible was near them. If the right hemisphere was damaged, the patients felt that a demon or a ghost was chasing them. If the damage

was in the left hemisphere, then the feeling of presence was in the form of voices. People with the damage in the left temporal cortex were particularly prone to this kind of experiences.

Persinger's findings had predecessors. It was established that epileptic fits are linked to disturbances of brain activity in the left temporal cortex where the functions of speech and "feeling of personal identity" are localized. During epileptic fits people may experience the feeling of the "presence of god". Some theorists suggest that prominent historical characters, such as the prophet Ezekiel, Joan of Arc and other suffered this kind of fits. Relying on this and other evidence Persinger hypothesized that the left temporal cortex, which gives a person the feeling of "oneself", when disturbed begins to interpret signals that come from the person's right hemisphere as the presence of "another self". Depending on a person's life history, the person can interpret this "other self" as an alien, a ghost, an angel or a god. To examine this hypothesis, Persinger and his colleague Stanley Koren created a special device they called "Octopus", which later became known as "God helmet". The device is a helmet consisting of eight electromagnets capable of emitting weak electrical field; when placed on a person's head, the device can stimulate various parts of the cortex [23]. The scientists reported that under certain spatial-temporal patterns of stimulation of the temporal lobes up to 80% of participants had had the "presence" experience. However, Persinger's interpretation of the feeling of "presence" as the presence of supernatural beings is questionable. It is possible that what was present was an alter ego of a patient himself or herself. Earlier experiments by Canadian neurosurgeon Penfield showed that electro stimulation of the temporal cortex can induce in epileptic patients subjective experiences, which feel authentic [24]. This suggests that the

"presence" phenomena evoked by the "God's helmet" could be artificially induced simulations rather than genuine mystical experiences.

Interestingly, the "presence effect" enhances the ability of extrasensory perception, or ESP; 75% of participants who were wearing the God's helmet had guessed the telepathically transferred messages correctly, whereas the chance probability of correct guesses was only 20% (see the next section). The assumption that there is a connection between the "presence" experience and the ability of ESP is not arbitrary. Among many of god's supernatural abilities is the ability to read people's minds. If stimulation of a certain area in the brain connects a person to the higher reality, then this reality might indeed enhance the person's supernatural abilities, such as ESP and telekinesis. If it were possible to show in experiments that these extraordinary phenomena are real, this would be another evidence for the existence of the supernatural.

Psi as a window into the supernatural

Why do stage magicians show tricks? Why do we enjoy watching the tricks while we know that those are just illusions? Could it not be because on the bottom of the mind we still harbour the belief that the impossible is still possible? We know that a human being can't levitate in the air or walk on water, but we can see ourselves doing these things in our dreams. In our dreams and the imagination all sorts of impossible things do exist, although our rational mind marks this existence as only ephemeral. And now suppose that we are seeing something impossible, like a person walking on water, happening on the stage. Immediately the thought "a person can walk on water" is upgraded in its rank on the scale of existence. Just for a fleeting moment at the back of our mind the miraculous phenomenon that we are seeing becomes a reality, while

our critical thinking keeps saying it is a trick. Seeing the miracle on the stage evokes in us the emotion of surprise and, usually, happiness [25].

The emotion of surprise is understandable, but why happiness? May be, because seeing a supernatural phenomenon touches upon the hope hidden deep in our subconscious that the supernatural is indeed real and we can be a part of it. If miracles do exist, then a miracle could happen to me, and my life is not just a random splash on the boundless ocean of time but has a meaning! Experiments showed that both preschool children and adults, in all other conditions equal, prefer watching a magical event to watching a novel physical event [26]. As children, we like playing magical games of pretend, because the feeling of being a powerful wizard or fairy helps us overcome the feeling of inferiority and gives us the feeling of control over the external world (see Chapter 8). In their attraction towards magical thinking, adults are no different from children.

In essence, stage magic is a simulation of the supernatural abilities of the mind. In psychology, stage magic can be used for studying cognitive abilities, such as perception, thinking and memory [27]. In my own research, I used magic tricks to study magical thinking and beliefs in the supernatural phenomena [28].

But could the supernatural phenomena themselves be studied under strictly controlled conditions, like experiments in science? Some scientists decided that they could. There appeared *parapsychology – an enquiry into the supernatural phenomena by scientific means*.

Parapsychological phenomena have been under investigation for over a hundred years. One of such phenomena is ESP - the ability to read other people's thoughts at a

distance or foresee the future. In a typical experiment they use Zener cards – five cards with one of the iconic geometrical shapes (like a cross, a circle or a star) printed on each card, in five copies each. In a test for ESP a person (an inductor) picks a card out of the shuffled pack and, looking at the picture, tries to pass the image to another person (a receptionist) who is situated in another room or building. The timing of the information transfer and reception is synchronized in advance. The receptionist tries to guess and draw the image. If the number of correctly guessed shapes is higher than the one expected by chance alone, then the result is viewed as confirming that the information transfer did indeed take place. There are multiple versions of this method. Many years of research on ESP showed that the effect is small but statistically significant [29]. Another effect studied by parapsychologists is telekinesis – the ability of a person to affect certain physical processes by a sheer effort of will; this effect too was supported in rigorous experimental studies [30][31]. Nevertheless, most mainstream psychologists are not persuaded by these results.

As a researcher who had never ventured in parapsychology, I too had my doubts about reality of parapsychological phenomena, and decided to conduct a few experiments myself. Because such experiments are time and labour consuming and a chance for their publication in a mainstream journal was near zero, my attempts were motivated by sheer curiosity, and I conducted the experiments in my free time. My first attempt was made in cooperation with a researcher of anomalous phenomena Adrian Ryan [32]. The experiment was on ESP, and we used the method developed by American physicist and parapsychologist Edwin May. A participant is told that approximately in 15 minutes he or she will be shown a photographic picture of a certain landscape or a city. What exactly this picture (named the "target") will show nobody knows, because the picture is on a computer’s hard disc mixed with 300 other

pictures. The participant's goal is to visualize and draw this picture. The participant is instructed, after the experimenter gives a signal by saying "target", to make a sketch by a pencil on a sheet of paper of the first image or landscape that crosses the participant's mind. After the sketch is made, the experimenter switches the computer on and the computer randomly selects five pictures out of the pool. It is assumed that the target is among these chosen pictures. Next, looking at the participant's sketch, the experimenter ranks the five chosen pictures on the scale of similarity to the participant's picture, with the least similar being given the lowest rank, and the most similar the highest rank. The computer then is put to work again and randomly picks a picture out of the five earlier chosen pictures. The chosen picture is considered to be the target, which the participant was trying to see by making his or her sketch. The experiment ends with the experimenter showing the target picture to the participant.

The experiment's point is as follows: If the target picture chosen by the computer out of 5 pictures is the one that the experimenter had ranked the highest, then the experimental trial is viewed as a "hit", meaning that the participant correctly guessed the picture from the future; if however, the target picture is ranked low by similarity with the participant's drawing, then the trial is considered a fail. If the participants were not able to "see the future", then the experimenter's highest ranked picture would be chosen by the computer by chance alone, that is in 20% of all trials. If however the participant could indeed see the image from the future, then the target picture would coincide with the experimenter's highest ranked picture significantly more frequently than in 20% of all trials. It is clear that in this experiment we deal not with the ordinary anticipation of future events on the basis of our past experience. For example, when we go to a cinema to see a new blockbuster movie we can anticipate the content, because our past experience tells us how blockbuster movies are made

and what they usually are about. By contrast, in this experiment participants' past experience is of no help, because past experience cannot tell the participants what picture out millions of possible landscapes will be shown to them.

Participants were divided in two groups. Participants of one group were rewarded for participation with a small sum of money, independently of their success at guessing the target picture. In the other group participants were promised a sum 20 times larger than the normal reward if their trial would be a hit. The idea was to find out whether the increase in motivation to make a hit would help the participants of the second group mobilize their ESP ability and produce a larger number of hits than participants of the first group. The results were unexpected. Participants of the first group produced the number of hits significantly above chance, whereas participants of the second group scored at chance level. This indicated that participants of the first group, rewarded by a small sum independently of success, indeed exhibited the ability to "see the future". At that their sketches were not always a mirror copy of the target picture; sometimes similarity was in meaning rather than in resemblance. For example, one participant drew a road, a windmill on the hill and mountains on the horizon, and the target picture proved to be almost exactly the same. Another participant pictured a strange human figure wearing a helmet and said it was an alien. None of the five pictures chosen by the computer even remotely resembled the figure of the alien. However, I noticed than one picture showed a wheat field with concentric circles and ellipses, as if printed on the field by a gigantic stamp. I remembered that crop circles are sometimes viewed as made by aliens, and gave this picture the highest rank; this picture turned to be indeed the target picture.

There are various possibilities to interpret the significant paranormal effect of this experiment, but all of them include a direct effect of Self on random events. One possibility is to see it as a result of the *experimenter's expectancy effect.* Since the experimenter knows the picture that is most likely to be a target, he could subconsciously affect the computer's random numbers generator and so influence the target selection. Such interactions between the Self and random target selection have been reported previously [33].

The question is why the participants who had been promised a large reward for successful guessing did not exhibit the ESP. A possible explanation lies in the "optimum of motivation" effect. According to this effect, if the achievement motivation is too great, animals and people start to be anxious and the effectiveness of their actions goes down [34]. In the replication experiment the method was the same, but the reward promised to the second group for successful guesses was a lot smaller. The aim was to find out whether decreasing the motivation to succeed at guessing the target picture would help participants of the second group do better. However, this time none of the two groups exhibited ESP.

The second study was based on the method proposed by American social psychologist and parapsychologist Daryl Bem. Bem claimed that his study showed the effect of "Retroactive facilitation of recall" [35]. The gist of the method is as follows. Participants were individually presented on a computer screen a succession of 48 words, which named one of 4 types of objects: Food, cloths, professions and animals. Participants had been instructed to visualize every word that they saw. After all the words had been presented, participants unexpectedly were given a memory test, which asked them to recall as many of the words as they could. So far this method

was a standard psychological test on memory. But then the most interesting part began. The computer randomly selected 24 words out of the earlier presented 48 words, and the participants were instructed to classify these words by the 4 aforementioned categories (i.e., food, cloths, animals and professions). In other words, the participants were given a practice exercise – the opportunity to practice with these words and so better remember them. If this practice exercise had been given *prior to the memory test*, we would not be surprised to find out that the participants recalled the words from the subgroup that they saw twice (let us call it "subgroup with practice" – S2) better than from the subgroup of the remaining words, which they only saw once (S1). However, because in this experiment the practice exercise was given *after the memory test*, the participants were expected to remember an approximately equal number of words from both of the subgroups.

But the unusual result reported by Bem was that when the computer counted the correctly recalled words it found that the participants recalled a significantly larger number of words from S2 than from S1. It appeared that the principle "repetition is a mother of learning" worked backwards: Even though the participants repeatedly saw the words from S2 *after they had recalled them*, these words were still remembered better than the words from S1. Understandably, in the *control session* of this experiment, in which participants were not given the practice exercise, yet the computer still randomly selected the 24 words out of 48, there was no a difference in recall between the two subgroups of words. Having published his study in a mainstream journal, Bem put a detailed description of his method on the Internet and welcomed replications. I was one of dozens of scientists who conducted the replications. Most replications failed, but there were around a dozen successful attempts [36]. My replication differed from other replications in that I repeated the

experiment 3 times, with 2 groups of participants (experimental an control) in each trial. I also conducted all the experiments in person, whereas most other replicators passed the duty of data collection down to students or research assistants. In 3 out of 6 groups of participants I found significant differences between numbers of words remembered from S2 and the S1. The probability of this happening by chance alone was 0.002, which was significantly lower than the criterion 0.05 for the "no effect" assumption accepted in science. This means that my results could not be explained by mere chance.

The difference between Bem's results and the results of my replication was that in 2 out of 3 trials that produced differences in recollection, the words from S1 were recalled significantly better than the words from the S2. Also, in one of these trials the significant effect was found in the control group and not in the experimental one. This goes against Bem's hypothesis that the memory facilitation through practice works backwards, "from the future to the past". It looks more likely that my results in this experiment, like in the previously described experiment, were caused by the experimenter's expectancy effect – the *direct effect of the experimenter's expectation on the data of the experiment.* This conclusion, however, warrants some explanation.

The standard "observer effect" is well known. This effect means that an experimenter can unintentionally influence results of an experiment by giving the participants suggestive signals through voice intonations, facial expressions or by skewing the experimental data in the direction of the experimenter's expectation. Fortunately, my experiment was safeguarded against the standard observer effect, because the participants could not see or hear the experimenter; during the experimental session I was isolated from participants by the opaque screen, and the participants received all

the instructions directly from the computer. The results were registered and statistically worked out automatically by the computer; the calculating program was locked, which excluded the possibility of tampering with the data. The only way for the experimenter to affect the results was if the experimenter's mind was employing its ability of telekinesis, by directly influencing the random number generator in the computer. Because I already knew the results of Bem's original experiment, my expectations regarding results of my experiment were biased by this knowledge; subconsciously, I expected that the words from S2 and S1 would be recalled with different success. Independently of my conscious intentions, my subconsciousness might have switched on and off the program of random numbers that the computer contained, so instead of randomly choosing the words out of the pool, the computer loaded the words that participant had recollected into S2 more frequently than into S1, or vice versa. Another possibility was ESP – a subconscious knowledge of which words will go into S1 and S2, and transferring this knowledge to the participants' minds, thus helping the participants remember words from one of these groups better than from the other. In a published paper [37], I called the results of my experiments the "non-standard observer effect", which essentially is the case of direct Self over matter/mind magical phenomenon (see Chapter 4, Table 4.1).

My results contributed to the discussions that go on in regard to the effects reported by parapsychologists. They showed that other researchers could replicate these effects, but not every time. This "diminished replicability" distinguishes parapsychological effects from scientific, where full replicability is required. What could be a cause of this diminished repricability of parapsychological effects? In my view, the cause is hidden *in the nature of objects studies by physical sciences and by parapsychology*. Sciences like physics or chemistry study inanimate objects which

devoid any spontaneity and unpredictability within themselves. For instance, physics of solid states studies metals, magnets, superconductors and similar macro objects whose properties are always the same. By contrast, parapsychology studies abilities of the human mind, such as ESP, telekinesis and clairvoyance. Even the human brain is an infinitely more complex object than any object researched by physics, and the human mind is even more complex (see Chapter 3 for more on this). The element of freedom and unpredictability that is inherent in the mind makes the mind a notoriously difficult object to squeeze into the full-scale replicability demand. For instance, mainstream psychology, which models itself on physical sciences, targets the functioning of the human mind as if the mind were a biological machine or a complex computer, in which information is transferred by means of the known physical forces. But even in the mainstream psychology the replicability of results is not fully guaranteed and tends to decrease with time [38]. In contrast, parapsychology explores the possibility of the transfer of information between the minds, or between the mind and an object, without engaging physical mediums (see Tables 0.3 and 4.1), which makes the full replicability even less likely.

To summarize, the studies of parapsychological effects showed that supernatural events are not just science fiction; such events do exist, but they cannot be manipulated the same way we manipulate physical events. For example, a stone thrown in liquid water will always sink, but the mind's ability of ESP or telekinesis can appear and disappear in different experiments, even when the experimental methods stay the same. *There is only a probability of the earlier received parapsychological effects to be replicated.* This may not be good enough for physicists and for the purpose of practical applications of these effects, but for the

purpose of examining whether it is possible to observe supernatural events by means of an experiment the reviewed effects are sufficient.

Indeed, unlike physical phenomena, *most conscious phenomena are unique and unreplicable on the full scale.* For example, we don't doubt that such phenomena, as love, hope and belief exist. But all these phenomena are unique. We cannot love a person repeatedly; even less we can love a person because we were told to do so. And what about art? Paintings by Picasso, Rembrandt, Modigliani are unique and impossible to replicate with exact precision. Dreams fall in the same category. Not a single night dream ever looks exactly like any other dream, yet we see dreams all the time. Magical phenomena of consciousness, studied by parapsychology, are the phenomena of the mind and not of nature. Their full-scale replication may not be guaranteed, yet they could be real. Shamans, priests, writers, artists and psychotherapists have been dealing with such phenomena for millennia, and now scientists too have to learn to deal with such phenomena.

The fact that paranormal effects of the mind do not conform to the known laws of nature explains why these effects are strictly "local": They appear only in specially designed conditions, are "subject specific" (in the same conditions, some subjects display the effects, while others don't), and are not fully replicable. The effects are also time specific: They could show up in the beginning of an experiment, and fade away in the end of the experiment; the same person can be able show these effects and then loose the ability entirely. When psychologists report studies on *normal psychological processes,* the results are supposed to be *stable during the time of the experiment*. For example, we want to study how many items (e.g., digits or letters) out of a group of 10 items a young person can repeat back immediately after the items are

shown on a computer screen for a brief moment and then deleted. Every day we invite 10 participants and continue the experiment for 10 days. What we get is that, although the number of recollected digits vary from person to person, the average number that people remember in each day of testing will be about 7, and this number will stay approximately constant over the whole period of testing, given that our method and the pool of participants stay the same. In contrast, paranormal effects could significantly decline with the time of testing, even if the conditions of the experiment are maintained constant. For instance, paranormal effects significantly declined with time of testing in both of my studies reported in this section, as Figures 6.1 and 6.2 illustrate. The decline effect escapes simple explanations, such as regression to the mean, since its initial starting point is the effects, which are significant, statistically solid and unlikely to be random deviations.

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Figure 6.1 about here

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Figure 6.2 about here

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Extinction of the paranormal effect was also evident in Experiment 2, Study 1; in this experiment, along with decline over the time of testing, the overall effect failed to reach a significant level (see Figure 6.3). How could the decline with the time of testing, and the failure to replicate paranormal effects be explained?

Figure 6.3 about here

The answer may lie in the nature of parapsychological effects. *A local character and decline of these effects with time of testing is built into the structure of the universe, as it guarantees the stability and permanence of the laws of nature*. Indeed, if magical phenomena such as direct Self over matter/mind were of the magnitude and universality comparable with that of the effects of gravitational or electromagnetic fields, then the world as we know it would collapse. People would be able to read each other minds, thus undermining the fundamental law of the universe – independence of the individual's subjective experience. Spies could read the classified documents, terrorists would be able to stop planes in the air by just an effort of will, and people could change the orbits of planets on their whim; because human desires and goals are so diverse and controversial, direct effects of these desires on matter would inevitably bring the universe in chaos, destroying order and predictability of natural processes. And of course, with paranormal effects being strong, objective physical measurements would be impossible, as the measurements' results would be affected by the experimenter's hypotheses and expectations.

But if parapsychological phenomena are potentially destructive, why do they exist at all, in the first place? Wouldn't the world be a safer place without such effects? And would it not be more logical to eliminate such effects by the Occam's razor - a problem-solving principle that, when presented with competing hypothetical answers to a problem, one should select the answer that makes the fewest assumptions?

Unfortunately, this simple solution doesn't work, and the reason it doesn't work is hidden in the nature of subjective experience, and in the structure of the universe. We know that for a human being the world is presented in the form of subjective experiences: We see colours, and not electromagnetic waves; we hear sounds, and not vibrations of the air molecules, we feel the sweet taste, not the structure of sugar molecules (see Chapter 3 for more on this). Subjective experience is a magical medium which converts things-in-themselves in the form we perceive them. As psychological experiments show, under normal conditions, we are not even aware of this medium and confuse perceived reality with physical reality [39]. As argued in Chapter 4, although subjective experience is an extremely flexible and "transparent" medium, like every medium it must exert a certain "resistance" to things-in-themselves. If subjective experience didn't exert such resistance, then phenomenal images of objects would be undistinguishable from things-in-themselves, and we would have to face the absurd conclusion that *a person and the world out there is one and the same thing.* If this were the case, a person would be nothing but a soulless self-replicating machine, or indeed a puppet simulated in the cosmic computer. Another absurd conclusion that follows from the "absolute transparency "of subjective experience assumption is that *we would not able to voluntarily move our bodies*. Indeed, our intentions to move would be similar to sleep paralysis, when a person is aware but unable to move [40].

Fortunately, this is not the case. That is why *under special conditions the resistance of subjective reality towards things-in-themselves has to show up, via distortions of certain processes, which under normal conditions are perceived undisturbed.* Exactly on the same reason paranormal effects should be expected. Note, that as a follow up to this expectation we have to accept that we *are not able to explain paranormal effects by physical causality*; there is no a causal mechanism that continuously connects an act of consciousness with the changes in physical processes. Paranormal effect could only be registered as *empirical facts* of correlation between psychological and physical events. In this regard, any intentional voluntary action is not different from a paranormal effect (see Table 0.3).

From the previous chapters we know that a random event is a magical event of the emergence/vanishing type, which is not determined by preceding physical causes. This makes random processes especially vulnerable to possible distortions when these events enter human subjective experience. In the quantum world, human subjective experience influences the probabilistic "superposition" states of a quantum object via the measurement devices created by an observer (see Chapter 4). These devices include the magical entanglement effect and are so sensitive that *the presence of subjective experience as a medium, which conducts things-in-themselves into the human mind, is revealed: The quantum object, which under normal (unobserved) condition collapses as a wave, under observation collapses as a particle.* This distortion of the objects' normal behaviour by human consciousness is, however, masked by the presence of the observing device: It looks as though the outcome of the measurement is determined not by the observer's consciousness, but by the structure of the observing device. The presence of the observing device also makes these distortions fully replicable.

In contrast, in parapsychology the attempt is made to affect probabilistic processes by a direct effort of the Self, which is not mediated by physical devices. As long the Self is not a physical entity, and random events do not obey physical causality, the direct effect of Self on random processes is not a physical process either.

Paranormal effects are distortions brought into random processes by the direct effort of the Self. For example, a participant is asked to make an effort of will in order to affect an outcome of chance processes, such as the work of a random number generator based on unpredictability of radioactive decay or electronic noise; as a result, one of the equally probably binary events (e.g., a flash of red light) starts to occur more frequently, then the other (e.g., a flash of green light) [41]. Just like a pencil appears broken when it is half immersed under water, certain processes (like the work of random number generators) become a little skewed if a special effort is made by a human subject with the aim of distorting these processes. These small distortions of physical processes caused by a human effort of will are what researchers call psychokinetic effects. Other "psi" effects, such as ESP or remote viewing, are also obtained in conditions that involve random events.

To reiterate, *the magical "psi" effects are distortions of the coordination between subjective reality and random processes at a fundamental level, which occur in specially designed conditions and are not mediated by physical forces*. This may explain the decline of parapsychological effects with the time of testing: When conditions are created for subjective reality to distort random processes, subjective reality quickly habituates to these conditions and has a tendency to reduce the distortions, and this explains the decline effect shown in Figures 6.1, 6.2 and 6.3. In the aforementioned physical experiments on quantum effects this kind of habituation

could not possibly happen, because an observing device mediates the link between an observer and the quantum object, and habituation is an exclusive property of living organisms.

Because of their local nature, small magnitude and the tendency towards declining with time, paranormal effects of subjective experience do not threaten the laws of nature. Nevertheless, these effects are important as they reveal the fact that *subjective experience is not an epiphenomenon, but a medium that possesses a certain degree of viscosity*. Thus, in chemistry a tiny proportion of an indicator substance is needed to show, usually by a colour change, the presence or absence of a threshold concentration of a chemical species, such as an acid or an alkali in a solution. Similarly, *paranormal effects of the direct Self over matter type are indicators, which detect the active presence of subjective experience in the universe.* This could explain why studying these effects, despite their small magnitude, evokes great interest among scientists, as well as hot discussions on validity of these effects [42]. Much in these discussions is missing the point, because of the assumption that paranormal phenomena are as stable and replicable as phenomena in quantum physics. As argued in this chapter, they are not, neither these effects can compete with physical effects on the scale of practical importance. All these effects could do is to support the assumption that subjective reality is not an illusion and can leave its mark on certain physical and psychological processes.

Perhaps, in the future the old principle of the “universal sympathy” (e.g., the magical unity between a person and the universe), which in the modern world was replaced by the universal law of gravity, will eventually recover part of its former glory. As a result, humankind will cease to feel itself being isolated and alienated in the cold and

indifferent universe, and the fear of the unavoidable (and possibly not so distant) perishing will change for a more optimistic mind-set, in which achievements of science will not be opposed to magic and religion, but integrated with magical and religious forms of coping with reality.

Conclusion: The necessity of the supernatural

When Napoleon pointed out to French mathematician Pierre-Simon Laplace (1749-1827) that he had not mentioned God in his book, Laplace replied, “Sire, I had no need of that hypothesis” [43]. In contrast to Laplace, French philosopher Voltaire (1694-1778), who was critical towards official Catholic Church, nevertheless was of the opinion that "If God did not exist, it would be necessary to invent Him” [44].

We started this chapter with the questions: Is there any evidence of god’s existence? Can one live without any belief at all? How do the religious belief, the belief in magic and the belief in science come together in the minds of modern rational people? Our analysis revealed that the belief in god sprouts out of the early people’s belief in magical reality of the afterlife. Spirits of the dead were the first gods. With time, the powers and responsibilities of the gods grew. From the spirits of deceased tribesmen who supervised the behaviour of the living, the gods became rulers of the elements, and eventually condensed in a “demiurge” – a creator and keeper of the universe. The omnipotent and omniscient God appropriated most of the supernatural in the world, with humans being ousted into the world, where they had to obey the merciless laws of nature: “By the sweat of your face will you eat bread until you return to the ground, for out of it you were taken. For you are dust, and to dust you shall return.”[Genesis 3:19]. The fact that ordinary people could share magical powers with god became to

be frowned upon. The belief in that the world is essentially magical had to go underground.

However, psychological studies of the recent decades revealed that in the depth of the mind of most people the belief in magic lives on [45]. This belief feeds into both traditional and "rational" religious practices. This belief fuels the people's enquiries into the existence of magical phenomena. These enquiries suggest that magical phenomena are at the foundation of the universe. The universe began as a magical phenomenon. Random events made in possible for the young universe to progress from simple elementary particles of matter to more complex structures and a living cell; a living sell developed into complex bodies and brains, and the complex bodies and brains provided the substrate for subjective experience to interact with matter. By inventing the world of the supernatural, people developed symbolic consciousness, free will and creativity, and through these magical abilities took the role of increasing complexity in the universe over from random events. Along this line, people became aware of the supreme intelligent power that made these magical transformations possible.

Science broke into human minds like a comet and squeezed both magic and religion to a limit, but was unable to annihilate them. Science rejected magic as a fallacy. Yet it is modern physics that discovered phenomena of magical participation between a person and the universe. Cybernetics and information theory accentuated the role of the mind in constructing our picture of the universe and creating artificial intelligence. Psychology appreciated the foundational role of human subjective experience and subconscious magical thinking in generating scientific theories. These developments revealed that magic does not contradict science; just the opposite, existence of the

supernatural phenomena make scientific enquiry more focused, by outlining limits of this enquiry. Neither should magical phenomena be viewed as undermining religion; for believers in a single god, magical phenomena should be regarded as reflections of god's powers in the facets of the crystal of the world; these reflections only point out toward the majestic source of the light.

Critical thinking makes some of us search for the evidence of the existence of god. Although these inquiries are inherently contradictive (if there were evidence, there would be no need in belief), they are not meaningless. Theoretical considerations and empirical studies increasingly show that both in the human consciousness and in the outer world supernatural events do exist. The presence of supernatural events shows towards the existence of the almighty power working in the universe. It is hard to express this thought better than Voltaire did this in one of his letters. After his aforementioned phrase that it would be necessary to invent God, he wrote "But all nature cries aloud that He does exist: that there is a supreme intelligence, an immense power, an admirable order, and everything teaches us our own dependence on it [46, p. 210].

But if god exists, why is there so much suffering in the world? Why terminal illnesses and fatal accidents, why innocent people die in wars, disasters and catastrophes? The answer is – because we are alive. For living creatures pleasure and pain, joy and sorrow, happiness and unhappiness, luck and disaster always go together. And those who live will have to die. But the distribution is unfair. Some people live long and happy lives, others are born in poverty, suffer and die young. For those who are less fortunate, philosophy and science is not much of a consolation. Only *the belief* in that

there is God, who loves us, sees our sorrows and will put things right in life or after death, *can offer a helping hand*.

Perhaps, when people die they discover that there is no God. But while they are alive, the belief in God helps the people to overcome sufferings and gives them meaning and hope.

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Part III

The supernatural in politics, economics and education

Chapter 7. Under the Spell: The Case of Russia

Abstract

The new concept – the belief in magic based social compliance (BMSC) – is analysed and applied to three ethnic groups: Russia, Mexico and Great Britain. The main target of the analysis is the phenomenon of “perestroika” in Russia in the 1990-th, during which authorities privatized the communal property of Russian people and the level of people's wellbeing sharply dropped. In essence, “perestroika” was a peaceful version of a political revolution that brought about serious demographic, social and economic problems. The hypothesis is put forward that the relatively peaceful character of “perestroika” can be explained by the centrally controlled manipulation with mass consciousness of Russian people, based on BMSC. Various scenarios are discussed of how the effect of BMSC on Russian people could be diminished, which would increase social activity of Russian people and their responsibility for the processes that go on in their country.

Problem

The maiden straight
Came to life, sat up, in great
Wonder looked about and yawning
As she sat her bed see-sawing
Said with pretty arms outstretched:
“Gracious me! How long I've slept!”
A. S. Pushkin. “The tale of the dead princess and the seven knights.” [1]

In the two decades following the 1991, one of the widely discussed problems in Russia was the country's demographic situation. According to some data, from 1991 to 2012 the natural decrease of population in Russia (not counting the increase by the influx of migrants) was around 12.5 millions (approximately 0.6 millions per year) [2]. In 2013 the World Health Organization in its yearly report estimated the average life span of Russian men as the shortest in Europe and Central Asia – 62.8 years [3]. In his address to the Federal Body of Russian Federation for the year 2000 Vladimir Putin said, “The number of us, the citizens of Russia, decreases from year to year. It has been for a number years already that the country's population shank by 750 000 with every year. And if we to believe the prognoses, and these prognoses are based on the real efforts of people who understand the area and devoted to the area their whole lives, in 15 years from now the number of Russians can decrease by 22 millions. I ask you to contemplate this figure: It is one seventh of the whole country's population. If the current tendency carries on, survival of the nation will be at stake. There is a real

threat for us to become a nation of the elderly. The demographic situation today is the worrying one" [4].

But the demographic situation in Russia is far from being the only reason for concern. Since 1991, criminality in Russia, especially organized crime, increased sharply. In the period of 1991-1997 the number of registered crimes doubled, and the number of solved cases plummeted. With the new Criminal Code of Russian Federation, introduced in 1997, criminality shrank but then again started to increase; the number of murder cases in Russia exceeded several times that in other industrial countries, such as USA, Great Britain, France and Germany [5]. In the new millennia, cybercrime joined the traditional crime.

Various forms of corruption are also on the increase. According to the "Economist" Magazine, while before "perestroika" corruption had been qualified as a crime, after perestroika corruption became the essence of the system, with a small group of people acquiring fortunes that exceeded the wildest fantasies of the tsars [6]. According to some statistical data, only in 2012 eight hundred of high rank officials and governors had to leave their posts for corruption [7].

These negative tendencies, which hit Russia from the moment of collapse of the USSR, could not be explained by the drop in quality of life, since on the Human Development Index (HDI is a complex comparative indicator of an average individual's span of life, literacy, educational level and quality of life in a country), published in 2012 by the UN, Russia occupied the relatively stable 55 place among 187 countries (somewhere between Kuwait and Romania) [8].

We have to acknowledge therefore that in the beginning of the 1990-th Russia experienced a major social and cultural shift, which brought the country to the edge of

demographic collapse and caused destruction of social order and public moral. In addition, the period since 1991 brought about negative tendencies in other domains of social life in Russia, such as public health, education, science and social security. There were, of course, certain positive changes as well: Freedom of speech, freedom of faith, freedom of emigration, and the abundance of goods in shops and supermarkets. But these negative and positive tendencies were happening slowly and gradually, whereas the aforementioned social-cultural shift happened sharply and proved stable. This shift was not a result of external factors such as war, hunger or sharp decline in the people's economic situation. The most astonishing feature of this socio-cultural shift was that it occurred relatively peacefully, without bloodshed or any noticeable mass protests. The peaceful character of the Russian “revolution” of the 1991 looks even more surprising if compared with the revolution that happened in Russia in 1917, which was followed by a long and bloody civil war.

I leave the proper analysis of the causes of the changes in demographic and spiritual situations in modern Russia to sociologists and specialists on population growth [9]. My personal view is that one of the causes of these changes might be the loss of the basic myth that unifies the people and creates the perspective for the people's future. Thus, in 1917 the basic myth of the Russian Empire (in the interpretation of the Deputy Minister of National Education count Uvarov) – “Orthodoxy, Autocracy and Nationality” - was replaced by the myth of “Building communism” in its Marxist version. When the latter myth was rejected with the collapse of the USSR, accepting the new myth of “establishing democracy and the free market economy” proved to be difficult for Russian people, because the majority of Russian population and the existing social institutions were not yet ready to live inside this myth. As a result, Russian society plunged into the state of “existential hollowness”. At a deep level, the

people ceased to understand what kind of country they live in and what they should strive to.

The question arises of why the generation of Russians that grew up under the myth of communism so easily and painlessly parted with this myth. Russian sociologist Sergey Kara-Murza sees the cause of the peaceful character of dropping the myth of communism in manipulation with mass consciousness of the Russian people by external and internal forces. He argues that for just two years (1989-1991) the ideologists of free market economy, without giving any proof, managed to sell the workers the idea that privatization of plants and factories and the accompanying unemployment were in the workers own interests [10]. I agree with this argument in that the manipulation with mass consciousness did indeed take place, yet the question remains open of why the workers submitted to this manipulation so easily. Indeed, as Kara-Murza rightly pointed out, the manipulators had not presented any logical reason or factual evidence for their suggestion that the transition to free market economy and unemployment was in the workers own interests, and any reasonable person would object to the government's actions that run against the person’s vital interests. So why didn't the workers object? Why did they listen to the manipulators? Why did the change of the property rights and the political system in Russia, as well as the collapse of the USSR, happen so quickly and without major protests? One of the answers to this question can be found in recent psychological studies in on magical thinking and magical beliefs in modern humans.

Obedience based on the belief in the supernatural

It needs to be noted from the start that this chapter is about voluntary submission of a person to suggestions or demands of a source of authoritative influence; this source

could be anyone or anything: a politician, a political party, a physician, a psychotherapist, a scientist, a financier, a charity organization, and a religious cult. It is not about obedience to demands, when disobedience involves a threat to the person's life and well being, for example, to obey or not to obey the traffic rules when you are driving a car, or to stop or not to stop the car if a traffic officer demands you to stop. It is about obedience when a person has the option of not obeying without consequences. People have such an option, for instance, when they decide of whether to vote or not to vote for a certain political candidate, to join or not to join a certain political demonstration, to keep or to stop taking an ineffective drug prescribed by their physician when the physician recommends to keep taking the drug, to invest or not to invest in a financial pyramid that promises an unrealistically high profit, to buy or not to buy a brand of goods that they don't really need, to follow or not to follow a certain superstition when not following the superstition is believed to bring a misfortune, and so on. It might sound puzzling to a reader, but the choice we make in the aforementioned situations is determined by the ancient mechanism we keep in our subconscious – the belief in the supernatural.

The belief in the supernatural and respect to authorities

As argued in previous chapters, the belief in the supernatural (e.g., in the power of gods, spirits and wizards to produce actions that violate the known laws of physics, biology and psychology) emerged approximately in the Upper Palaeolithic sometime at 30000 years ago [11][12][13]. Being in many places simultaneously, going through solid walls unharmed, ruling the weather and crops, feeding on the smoke produced by burning sacrifices animals, and reading people's minds – these are just a few of a vast number of supernatural powers that gods and spirits posses. When addressing gods and spirits of the dead ancestors people were seeking the gods and spirits'

cooperation in solving their vital problems, such as protection from predators and success in hunting. In return, the people were happy to make sacrifices to gods and obey the gods' commands that the gods gave directly or indirectly, through mediators – tribal leaders, medicine men, wizards and shamans. For instance, when asking for a healing of a sick person, people addressed a shaman; if the shaman agreed, he or she immersed himself or herself in a special meditative state, which allowed them to communicate with the gods and ask for their cooperation [13][14]. Recent psychological studies suggest that the belief in supernatural powers, including the belief in magic and in traditional gods, is not ancient history but a fundamental feature of the human mind [15][16]. Experiments indicated that in modern industrial cultures most educated adults consciously deny that they believe in magic yet behave as if "on the bottom of the heart" they indeed believe in the supernatural [17][18].

In traditional cultures, to which many cultures of Africa, Asia, South America and islands of the Pacific belong, the belief in the supernatural is practiced openly. In those cultures people take messages of their leaders as imperatives sanctioned directly by gods and spirits. Consequently, in these cultures suggestions of the leaders rarely come under scrutiny in regard to whether these suggestions are true or false. In contrast, in modern industrial cultures people are capable of critical analysis of messages that come from their authorities. However, in certain circumstances even when the critical analysis shows that the authoritative message is wrong and/or harmful to a person, the person nevertheless still takes this message as an order and voluntarily follows the order. In other words, while in traditional societies people obey authoritative influence without analysing legitimacy of this influence, in modern industrial societies people sometimes obey authoritative messages in spite of a clear realization that such messages shouldn't be trusted and/or can bring harm to the

people. Exhibited by modern rational people, obedience of this kind suggests that modern rational people subconsciously still believe in the supernatural abilities of the persons of power. Psychological experiments supported this suggestion; they showed that under certain conditions educated adults do believe in that a person of authority (e.g., a psychology experimenter) possesses supernatural powers. One of these conditions is removing the people's psychological defences against the belief in the supernatural. Such defences can be removed when an authoritative person demonstrates to participants effects that look persuasively supernatural, and suggests that not believing in his or her magical powers might negatively affect the participants' future lives or their valuable objects [19][20][21].

In real life unrealistic, objectively wrong and sometimes immoral requests can have a similar suggestive effect if these requests come from an authoritative source and target the people's personally significant objects. *The people's subconscious belief in the authorities' divine powers can take an upper hand over the people's critical thinking and make the people obey doubtful and even obviously wrong requests.* In this chapter, this form of social obedience will be referred to as *"the belief in magic social compliance" - BMSC.* Let us consider three issues that this new concept raises: (a) The definitive feature of BMSC; (b) The distinction of BMSC from other forms of voluntary social submission, which is not based on the belief in the supernatural; (c) The proofs of the existence of BMSC.

BMSC – the definitive feature

By definition, BMSC takes place when the hidden belief in the divine powers of authorities overcomes critical thinking and elicits the reaction of submission [20][21]. It is established in psychology that emotional preferences can influence reasoning,

perception, and memory [22][23]. For example, people can be unable to see negative sides of a person they are in love with. The behaviour controlled by emotional preferences looks similar to BMSC. However, there is one feature that distinguishes BMSC from actions governed by our emotions: While determining our actions, our subconscious belief in the supernatural doesn't affect our critical thinking. As a result, people who act under the influence of their subconscious belief in the supernatural inevitably come into contradiction with themselves: (a) they are aware that the ideas suggested to them by the authority are wrong and run against their personal interests, and (b) the people act as if the idea were true and profitable for them.

The aforementioned contradiction is a case of the word/action dissociation, when a person acts differently from what he or she promises. A typical example of this kind of dissociation is intentional or unintentional lying. For instance, in moral domain people can preach morality but in their practical actions follow their selfish interests [24][25]. Individuals who act under the influence of BMSC display dissociation that runs in the opposite direction: They might say that the offered message, demand or request is wrong and damaging to their private interests, but in reality the individuals accept the message, demand or request as true and act accordingly. For example, experiments have shown that educated adults verbally denied that they believed in that a magic spell could influence their lives, yet they prohibited the experimenter to cast the spell in the fear that the spell might actually work [18][19][20]. In this chapter, the dissociation of this kind will be referred to as "the inverted word\action dissociation". The inverted word/action dissociation can serve as an objective indication of the presence of BMSC. Indeed, without assuming a person's implicit belief in the authority's divine powers it would be hard to explain the fact that the person voluntarily complies with the authority's demands that the person explicitly

views as wrong and/or damaging to his or her interests. To conclude*, the inverted word/action dissociation is the definitive feature of the BMSC.*

BMSC and other forms of voluntary social obedience

BMSC should be distinguished from obedience based on indirect or direct logical persuasion. For instance, the "elaboration likelihood model" model by Petty and Cacioppo [26] describes two ways to persuade people to do something. The *central way* to persuasion is based on putting forward logical proofs of why it is profitable to a person to believe a certain message and follow the message. If the person finds the logical proofs persuasive he or she will accept the message, otherwise the message will be rejected. In contrast, the *peripheral way* to persuasion targets the person's emotions rather than his or her logical thinking; for example, a suggestive message emphasizes authority or physical attractiveness of a messenger (e.g., the message comes from a famous scientist, an athlete, a movie star or a beautiful woman).

The feature that distinguishes BMSC from compliance based on both central and peripheral types of persuasion is exactly the inverted word/action dissociation. Compliance based on elaboration likelihood model does not contain word/action dissociation. A person either consciously accepts the message as a persuasive one and acts accordingly or rejects the message as a wrong one and refuses to act in accord with the message. In contrast, people who act under the influence of BMSC objectively assess the message as a wrong or damaging one yet take the message as if it were right and comply with the message. As a result, the behaviour of a person under the influence of BMSC is similar to the behaviour of a person who acts under hypnosis, with the only difference being that in the hypnotized person his or her

critical thinking ability is switched off. In contrast, the person who exhibits BMSC is in full possession of his or her critical thinking ability and acts consciously.

BMSC - empirical proofs

Like any hypothesis in science, the BMSC hypothesis can only have a value if it brings us to certain nontrivial expectations, which can be empirically verified. Let us consider some of these expectations.

Psychological studies have shown that when a suggested message was placed in the context of magical mythology (e.g., the messenger is presented as a wizard or a witch, who uses magical incantations or a magical wand), then under certain conditions educated adults exhibited the inverted word/action dissociation. For instance the participants argued that the experimenter's assurance that his or her magic spell will affect the participants' future lives was wrong, yet the participants acted as if this message were right and prohibited the spell [17][18[[19][20]. However, *unlike in laboratory experiments, in real life messages that appeal to the people's hidden belief in the supernatural are presented to people in a mundane form and don't mention magic and witchcraft.* For example, a presidential candidate could promise, if elected, to overcome a gargantuan budget deficit without increasing taxes; an automobile manufacturer could suggest that buying this brand of car will make a person rich. It is clear that such promises are unrealistic and appeal to people's implicit belief in the authority of the source of these messages and not to the people's logical thinking. Promises of this kind are typical for politics, commerce and pharmacology [27][28][29][30]. If the BMSC hypothesis is correct, then *a message that appeals to BMSC must produce the inverted word/action dissociation independently of whether the message is or is not explicitly associated with magic.*

With the aim of examining this expectation an experiment was designed. *The first group* of participants (university graduates and undergraduates) was asked whether they would allow the experimenter to put a magic spell on their future lives (magic loaded context). The spell was taken from an old book on magic, and there were two kinds of the spell: a good (which promised to make the participants' future lives good and problem free) and a bad (that could make their lives hard and full of problems) spell. In the interview the participants denied that either of the spells could affect their future lives, but acted as if they really believed in the spell's magical power, by allowing the experimenter to cast the good spell and prohibiting the bad one. Participants of *the second group* received the same instruction, but this time the instruction was free from explicit association with magic; the participants were suggested that if the experimenter increased or decreased the number of ones on a computer screen (e.g., changed 1111 into 11111111 or into 11), then the number of difficult problems in the participants' future life would increase or decrease proportionally (magic free context). The results (illustrated in Figure 6) were clear; although all of the participants told that this suggestion is wrong, in their practical actions they behaved like the participants of the first group: They allowed to decrease the number of ones on the computer screen but prohibited to increase the number [31]. The results confirmed the prediction: They showed that *a message that targets people's implicit belief in the authoritative person's magical powers produces the effect of inverted word/action dissociation independently of whether this message is or is not explicitly associated with magic.*

Figure 7.1 about here

Another expectation that follows from the hypothesis of BMSC is that *in modern societies social rules should exist that historically were introduced as divine and sanctioned by god*. Laws like that do indeed exist. According the Judeo-Christian tradition, Moses obtained the moral code (the Ten Commandments) directly from god, although today most people view these laws as conventional rules developed by society. Research has shown that some individuals, both children and adults, are capable of voluntarily following these rules in the absence of surveillance, even though following the rules runs against the individuals' private interests [32][33]. This proves that implicitly the individuals view these rules as divine.

The BMSC hypothesis also implies that *a positive correlation must exist between BMSC and people's belief in the supernatural.* This means that people who are more inclined to exhibit BMSC are supposed to be more likely to acknowledge their belief in the supernatural than people who are less inclined to exhibit BMSC. Indeed, if BMSC feeds on the energy of the implicit belief in the supernatural, then in individuals whose belief in the supernatural is close to the "surface of consciousness" and is blocked by psychological defences to a small extent only, this energy source is easier to access than in individuals whose belief in the supernatural lies deep in their subconscious and is heavily sealed by psychological defences. As a result, people of the former type will be more prone to exhibit BMSC than people of the latter type. Studies on "interrogative suggestibility" provide experimental evidence of the positive correlation between people's tendency toward BMSC and their belief in the supernatural. *Interrogative suggestibility* is defined as the degree to which people are prone to change their opinions under the pressure of the interrogator [34]. In the experiment, a person's opinions are assessed twice on the scale of interrogative

suggestibility (SIS): Before and after the interrogator had tried to influence these opinions [35]. The difference between the person's initial opinions and his or her opinions changed by the suggestion is a version of the inverted word/action dissociation and can be interpreted as a measure of BMSC. Research revealed a significant positive correlation between people's scores on the SIS and their scores on the scale of the belief in the supernatural [36][37][38], which supports the aforementioned expectation.

Finally, the BMSC helps explain the phenomena, which are well known in psychology but still lack a persuasive explanation. One of these phenomena is Stanley Milgram's "obedience to authority" effect [39]. In Milgram's experiment a participants was asked to teach a "student" (in reality - the experimenter's confederate) to perform certain tasks; for every mistake the "teacher" was supposed to punish the "student" by an increasingly powerful eclectic shock. Unbeknown to the "teacher", the "student" was not given the electric shock and simply simulated pain from the negative reinforcement. The experiment's aim was to find out the magnitude of the shock (measured in volts) under which the "teacher" would refuse to obey the experimenter's demand, by ceasing to increase the voltage. Surprisingly, 62% of participants succumbed to the experimenter's pressure and increased the intensity of the shock up to the deadly 450 volts; this happened in spite of the fact that a refusal to increase the shock did not involve any material or social losses for the "teacher". From a certain moment of the experiment the participants understood that they didn't have any moral justification to keep hurting the "student"; the participants exhibited perspiration, their hands were trembling, they began arguing with the experimenter yet continued to increase the shock. The number of participants who refused to increase the shock sharply dropped only when the experimenter was not personally

present at the experiment but gave his commands to the “teacher” over a telephone. As Milgram writes, “something akin to fields of force, diminishing in effectiveness with increasing psychological distance from their source, have a controlling effect on the subject's performance” [39, p. 147]. Psychological mechanisms of this “invisible force” remain, however, unexplained.

It is quite obvious that in Milgram's experiment participants exhibited the definitive feature of BMSC – the inverted word/action dissociation. Indeed, the participants disapproved of the experimenter's demand to keep increasing the electric shock's power, they argued with the experimenter yet continued to obey his instructions. In other words, the participants viewed the experimenter's demand as wrong and harmful both to the “student” and to their own moral, yet acted as if the demand were right. From the perspective of BMSC hypothesis, *in Milgram's experiment participants behaved as if subconsciously they believed that the experimenter's orders were sanctioned by supreme powers, which made the participants free from personal responsibility for their actions.*

One might ask what relation did the participants' compliance with the experimenter's orders in the above experiment, however impressive, had with the supernatural? The answer is hidden in the history of the development of compliance with authority. Indeed, suppose that in the early humans compliance with the authority (a tribal leader, a shaman, a medicine man) and with the tribal laws were absent. One consequence of this situation would be the fact that each individual would have acted without coordinating his or her actions with the actions of other group members, and this would quickly end in death of both the individual and the group. Early human groups did not have police, judicial system and other means of law enforcement. The only way to force a person to comply with the authority was to make the person believe

that gods and spirits sanction the authority's orders. For example, children were trained from their early years that if they did not comply with the elders' orders or the custom of sharing their food with other tribesmen, then this would infuriate the spirits of dead ancestors who would then punish the children for disobedience. With the historic and cultural development, tribal leaders and shamans were replaced by politicians, physicians, financiers, scientists and other sources of authoritative influence whose orders can be discussed and criticized. Nevertheless, the implicit belief in that people of power have a contract with gods can still make us obey these sources of authoritative influence, even against our will. As American psychologist Cialdini puts it, in the Old Testament we read, "…what might be the closest biblical representation of the Milgram experiment - the respectful account of Abraham's willingness to plunge a dagger through the heart of his young son, because God, without any explanation, ordered it. We learn in this story that the correctness of an action was not adjudged by such considerations as apparent senselessness, harmfulness, injustice or usual moral standards, but by the mere command of a higher authority. Abraham's tormented ordeal was a test of obedience, and he – like Milgram's subjects, who perhaps learned an early lesson from him – passed [40, pp. 217-218].

Altogether, the existence of BMSC confirms that, freed from explicit association with magic and renamed as "compliance" and "conformity", the belief in supernatural powers of authority figures survived in the modern industrial world – the world, which otherwise worships science and logical thinking.

BMSC as the economy of psychic energy

According to psychoanalysis, every conscious action requires spending psychic energy [41][42]. Psychic energy shouldn't be confused with physical energy that we spend when we do physical exercises. Thus, after a difficult examination we feel tired like after doing hard work, despite we had not spent any physical energy. Recent neurocognitive studies revealed that psychic energy is not a metaphor, but a real force that can be measured by cardiovascular and biochemical indicators, such as heart rate and blood glucose level [43][44]. The experiments showed that any act of self-control decreases the blood glucose level below the optimal line, which makes the subsequent actions of self-control more difficult.

Spending psychic energy happens in any activity that includes the effort of self-control. For example, making such an effort is necessary in order to cope with worrying thoughts about inevitability of death; as a result, thinking about death consumes psychic energy, thus decreasing a limited amount of this energy stored in the organism. In a series of experiments, one group of participants was asked to write a story about death, while another group wrote a story on an emotionally neutral topic. After this the participants of both groups were given identical tests that required a high level of self-control. The results showed that the participants who had written a story about death performed on the tests significantly worse than the participants who had written a story on a neutral topic [45].

Inhibiting the impulse to commit an action inspired by BMSC requires a substantial effort of self-control, which consumes psychic energy by taking the energy from a limited reservoir. As a result, a smaller amount of psychic energy is left in order to achieve other goals that require self-control, such as political activities, achievements in education, medicine, science, and art. The history of humankind shows that people usually fall under the power of dictatorships not when the people prosper, but when

the people spend most of their psychic energy to provide for their basic needs and there is not much energy left for socially creative activities. The XX century provides examples, such as Russia in the beginning of the century, exhausted by WWI and the revolution of 1917, impoverished Italy in the 20-th, Germany in the 30-th, devastated by WWI and the great economic depression. In their struggle to survive in the world of unemployment and economic devastation, in order to save their psychic energy people invested their trust in charismatic political leaders, whose orders they followed unconditionally. These examples illustrate that *the need to save psychic energy can force people to succumb to BMSC.*

In sum, the recent experiments on magical thinking and magical beliefs in modern industrial cultures bring us to the following assumptions:

-- The belief in supernatural abilities of authorities is a special structure in the mind of a modern person that has its origins in prehistoric times and encourages a modern educated person voluntarily comply with the authorities' requests and suggestions that could run against the person's own interests, thus creating the phenomenon of BMSC;

-- Science education ousts the belief in the supernatural in the domain of subconscious and seals this belief with psychological defences;

-- Depending on how deeply in the subconscious the belief in the supernatural is ousted, people can be divided in three categories: Those whose belief in the supernatural on some reason is not ousted into the subconscious (Type 1), those in whom this belief lays in the shallow layer of their subconscious and is protected by weak psychological defences (Type 2), and those whose belief in the supernatural is ousted deeply into their subconscious and is sealed by strong psychological defences (Type 3);

-- Overcoming the tendency toward acting in accord with BMSC requires spending psychic energy taken from an individual's limited resource of such energy, whereas succumbing to BMSC saves psychic energy.

Let’s see how the aforementioned assumptions could help answer the question put in the beginning of this chapter: Why did the Russian people allow their high authorities to privatize the people's property without mass protests against the obvious social injustice caused by this privatization?

Through the magic crystal: Mexico, Russia and Europe

In any country population is a mix of Type 1-3 categories of people; nevertheless, countries vary in regard to the distribution of people of these categories. Thus, anthropological and ethno-psychological studies of Mexican culture revealed that the belief in the supernatural is widely spread among the population and openly acknowledged by people. One of the typical folk superstitions is the believe in Nagual – a person who at night turns into an animal [46][47]. The belief in the supernatural in Mexico is particularly strong among rural population, where this belief coexists with Catholic faith. For example, people of Zapoteck subculture believe that they have two souls: A Christian soul and a “tono” - an animal soul (e.g., the soul of a wolf or a snake) [48]. The belief in witchcraft is common even among Protestants who have a certain level of education and lived in large cities of Mexico or the US. An experimental study of people's tendency to succumb to BMSC conducted with uneducated inhabitants of Central Mexico (who allegedly is a representative sample of most of the rural population in Mexico) showed that these people predominantly belong to Type 1 [49]. Not only they believed in the experimenter's magical powers but they also openly acknowledges their belief in witchcraft. Viewed in a wider

context, people of this type are not inclined to put requests and suggestions of the authorities under doubt. They are politically and socially inactive and are not disposed to take responsibility for the processes that are going on in their village, city or country. In a country like that proportion of Type 1 people reaches its maximal level. In such a country riots and revolutions do happen, but these social movements usually have other causes than the tendency to resist the demands of local authorities; mostly, such revolts are caused by religious, national or tribal conflicts. Countries with the dominance of Type 1 population are recognizable by features such as the abundance of slums, dirty and abandoned streets in the cities, poorly kept roads, poor sanitation and general shabbiness of the vital aspects of life, even in the areas that do not require much investment of money and effort in order to be kept at an acceptable level. In the country of this type, it is not safe to walk in the streets at night. Usually, this is a poor country, with a high level of corruption and a low level of public education and medical service. Fundamental scientific studies in the country's universities are rare and poorly funded. At the same time, the country like that could strike us with the beauty of its nature, art and architecture.

Type 3 people dominate in Western European cultures, such as the UK and Germany. It doesn't mean that the belief in the supernatural is absent in European cultures. For example, in modern England individuals who officially practice magic are in the thousands, and these individuals come from the educated middle class background [50]. In the middle of the XX century, 23% of people in England believed in ghosts, 53% visited a fortune-teller at least once, and 51% regularly examined horoscopes [51]. There is no reason to believe that today the situation is much different. Nevertheless, the studies showed that the majority of British adults consciously deny that they believe in the supernatural. Even when psychological defences that prevent

people from acknowledging their belief in the supernatural were partly removed, the participants kept denying their implicit belief in magic. This belief, however, revealed itself in the participants' behaviour when the defences were completely removed [18][19][20]. When the defences were completely removed, British participants' behaviour was not significantly different from the behaviour of uneducated adults in Mexico. Nevertheless, in their everyday life countries of the 3rd type make a sharp contrast to countries of the 1st type. In the former, people are significantly less reliant on the power of authorities at all levels, from a village to a parliament, than in the latter. At the same time, population of the 3rd type is more patriotic and feels personal responsibility for what's going on in their village, city or country. In these countries, public places (e.g., a national reserve, a park, a public toilet) are kept in order even when surveillance is absent, and it is safe to walk on the streets at night. Governmental decisions are widely discussed in the media, and can be declined or corrected. Fundamental studies in science are encouraged and supported by governmental bodies. There is a certain degree of corruption and criminality, but these social sores are under control; most crimes are solved, corrupted politicians persecuted. Altogether, life of and average citizen in the 3rd type countries is more orderly and civilized than in the 1st type countries.

In the USSR the belief in the supernatural was generally condemned. In modern Russia the number of people who declare themselves believers in the supernatural grew immensely. According to statistical surveys only 10.3% of respondents answered that they did not believe in the supernatural of some kind, religious beliefs included [52]. Experiments revealed that Russian educated participants believed to a significantly greater extent than German participants that a psychology experimenter who demonstrated an effect that looked like a case of real supernatural magic does

indeed possess supernatural abilities. Russians also exhibited a significantly stronger belief than Germans in the anomalous phenomena, such as Loch Ness monster, UFO and the abominable snowman [53]. Altogether, as much as the behaviour of a limited sample of participants can represent the whole population, Russian educated adults (and in the USSR most adult population had at least secondary school education) fall into Type 2 category. Their belief in the supernatural is ousted into the shallow level of their subconscious and psychological defences that seal this belief are relatively weak. In a country of the 2nd type most people have a secondary school education; consciously these people cherish science and are capable of critically assessing suggestions and demands of authorities. At the same time, an average citizen is inclined to load the burden of taking important social decisions on the authority's shoulders and does not feel personal responsibility for such decisions. While being critically disposed toward decisions made by governmental institutions, the citizen nevertheless voluntarily complies with these decisions. In their everyday life, countries of the 2nd type stand in between countries of 1st and the 3rd type. Whereas the cities are kept in order, it is not always safe to walk in the streets at night. Public places that are not under surveillance (e.g., a meadow in the forest, a public toilet) are not always clean. Corruption and criminality are at high level, most crimes remain unsolved, and punishments for corruption are absent or symbolic. Patriotic feelings are at a low level, small businesses are depressed by corrupted local authorities or controlled by organized crime.

It would appear that Russia has all necessary conditions to become a prosperous European country: Huge natural resources, educated population, parliament, democratic constitution, and freedoms of speech, faith and movement. However, the country's development is in a standstill. Tremendous financial flows go into the banks

of foreign countries, production of goods (except arm production) is at a low level, financial support of fundamental scientific research often doesn't reach the destination and dissolves in bureaucratic structures, forcing young and talented Russian scientists to search for a work abroad. There is an impression that the country with a huge cultural and productive potential is under a magical spell, which it desperately tries but fails to shake off.

Who put the spell on Russia? The historical roots of BMSC

The origins of nation's BMSC type are rooted in the nation's history. Thus, in the peoples of the Aztec's empire the belief in magic was a part of the main religion. With the conquest of Mexico by Spanish in 1512-1521, the indigenous population was converted into Catholicism. However, in Mexico Catholicism was tolerant towards traditional pagan beliefs in the supernatural. Persecution of witches by the Holy Inquisition in Mexico did not cross the borders of Mexico City and did not involve the indigenous population. For the whole period of Spanish Inquisition in Mexico (1571-1820) only around 50 people were executed, and only some of them were put to death for witchcraft [54]. As a result, the majority of Mexican population stuck to their traditional belief in magic, which is currently mixed with Catholic beliefs in Christ and Virgin Mary.

In Western Europe, in the time of Roman Empire the belief in magic was a part of official religion as well. With the adoption of Christianity by Roman Empire in the IV century AD and during the Dark Ages the belief in magic continued unperturbed. However, in 1484 Pope Innocent VIII issued the papal bull that condemned witches in Germany. The Holy Inquisition was founded and the witch-hunt began. According to some estimates, during the whole period of the witch-hunt up to 100 000 persons were

burned at stake [55]. As a result, an average inhabitant of Western Europe developed the fear of being accused of witchcraft, which ousted the belief in magic into the subconscious. This fear became one component of the psychological defence that prevents the belief in magic from entering the domain of conscious awareness. The official belief in Christ and Scripture became the only zone where miracles were allowed to happen. With the emergence of science in XVI-XVII centuries, the fear of being accused of witchcraft was joined with the shame of believing in the supernatural. Science condemned the belief in the supernatural as a fallacy, and medicine proclaimed this belief a clinical disorder. As a result, an average European citizen developed BMSC of the 3rd type, when the belief in the supernatural is ousted deep into subconscious and is sealed by psychological defences of fear and shame.

Before the onset of Christianity in the end of the X century, magic in Russia was a part of pagan polytheistic beliefs. Like Catholic Church, Russian Orthodox Church condemns magic for its link with the devil. Nevertheless, in Russia persecution of witches was significantly less intense than in Western Europe, and the number of executions of alleged witches from XI till XIX centuries is estimated only in tens (perhaps hundreds) [56]. As a result of reforms initiated by Peter the Great in the first half of the XVIII century there appeared educational institutions of the European type, and science made its way into Russian culture. In the Soviet period official communist ideology suppressed the belief in god and magic, but the pressure on magic by religion became less intense. As a result, in the Russian version of BMSC the belief in the supernatural was ousted into the subconscious not as deep as in Western European inhabitants, and psychological defences against the belief in the supernatural in the Russian people – fear and shame – were far not as strong as in

Western Europeans. This resulted in that there appeared the intermediate 2-nd type of BMSC, which is characteristic for most population in modern Russia.

The peaceful revolution

In modern Russia ideologists of "perestroika" skilfully used the Russian people's inclination toward BMSC in order to privatize the public property. In the end of the 80th, when Soviet people unconditionally trusted their government and official mass media, the central channels of Soviet TV were given to the "wizards" - magical healer Allan Chumak and hypnotizer Anatoly Kashpirovsky. Millions of people drank the water magically "charged" by Chumak or moved with their heads sitting in front of the TV on the order by Kashpirovsky. By the law of big numbers, some of the people indeed felt as if they had an easing of their sufferings, due to hypnosis and the placebo effect. In the beginning of the 90th the "wizards" suddenly disappeared from the TV screens and were replaced by the ideologists of the free market economy. The new showmen put forward the idea of "privatization", but in reality – *the plan of stripping the people off their property and moving the property into the hands of the party and KGB authorities, their friends and relatives.* Although every person with a certain level of education (and those were the majority of Russian population) clearly understood that privatization of the communal property would lead to drastic inequalities, the deal was done. The "wizards" strengthened the people's subconscious belief in that the authorities have undisputable divine right to decide what to do, and the people accepted the idea of privatization without resistance.

Unlike Stalin, who was adored by Russian people, Yeltsin was not viewed as a living god, his human weaknesses and a passion for drinking were widely known and openly ridiculed by the population. And yet Yeltsin managed to do what seemed to be

impossible – cancelled the Soviet Union, put a ban on the Communist Party of the USSR and took the communal property from the people's hands. Like Russian tsars, who passed their power to their heirs, Yeltsin passed his “magic rod” of power to Vladimir Putin. That is why Putin – a mid-level officer in the Soviet KGB, unknown to the people, not a leader of a political party and without original political ideas of his own, suddenly became a victor at presidential campaigns: Succumbing to BMSC, the majority of Russian population voted for Putin voluntarily, when the holder of the magical power – Boris Yeltsin – said the people to do this.

What to do?

So, how could the magic spell, which fell on Russia, be shaken off? What could Russian people do in order to free themselves from the inclination of complying with orders of authorities when the orders run against the people's conscious intentions? And what do they should strive for now, when the deal is done and the people are in the middle of the trap? Do they need a new social revolution? But the history showed that social revolutions do not free peoples from BMSC. Englishmen executed Charles I of England, but got Charles II instead. Frenchmen executed Louis XVI of France, but got in exchange the Great terror of the French revolution and then Napoleon, who wasted 1.5 million of the best French men in incessant wars. Russians executed Nicolas II, and got in exchange Lenin, Trotsky, Stalin and the Red terror as well. So, another social revolution doesn’t seem a good choice.

Rather, what Russian people need to strive for is what the Spanish philosopher Ortega y Gassett called “the revolt of the masses” [57]. By the revolt of the masses, which happened in the first half of the XX century, Ortega y Gassett meant not the armed struggle but relatively fast (on the scale of history) alterations of the masses'

psychology in Western Europe. As a result of these alterations the world has drastically changed. While before the year 1920 masses in Europe patiently endured modest existence in the shadow of culture, in the following three decades they demanded their fair share of cultural and material wealth: A proper salary, a family car, the opportunity to educate their children, spend their holidays in nice resorts, attend theatres, libraries and restaurants. In other words, the places, which traditionally only rich and famous could afford, suddenly became rather crowded. If the “revolt of the masses” notion is projected onto the problem of freeing Russian people from the tyranny of BMSC, it becomes clear what Russian people should strive for. They should strive for the situation when an average Russian citizen ceases to view the authorities' suggestions as if god sanctions them; simultaneously, the citizen should stop shifting the responsibility for his or her life conditions to the authorities' shoulders. What one needs is to change the feeling “they are deceiving me” for the feeling “I am allowing them to deceive me”. The understanding should appear that the order in the country starts with the order in the street next to your house, with the clean backyard, with not leaving garbage on the forest meadow after your picnic, from your tolerant and decent behaviour in public transport, from not passing by when you see that an innocent person is being hurt and a thousand of other small issues that our everyday life is made from. Understanding this and putting such an understanding into action would indeed be the revolt of the masses, which, together with other positive changes in the country, could take the magic spell off Russia and turn Russia from the country of the Type 2 into the country of Type 3. Let us try to analyse what could be done in order to assist this process and liberate the Russian people from the magnetic power of BMSC. Since we already know the psychological causes of BMSC, we can consider various scenarios that such liberation might take.

The most simple and easy way is going “up down” - to supply the population with the psychic energy necessary for resisting the tendency to BMSC. For example, the population can be provided with good salaries and shorter working hours. This was the way United States took in order to change the economic and psychological situation in post war Germany and other European countries whose people suffered as a result of WWII. According to the so-called “European Recovery Program” (sometimes also called “Marshal’s plan”), in 1948 Western Germany and other European countries received $13 billion (approximately $132 billion in current dollar value as of October 2017) support to help rebuild their economies. The USSR refused to receive this kind of help, and modern Russia is unlikely to get it either; rather, Russia is more likely to suffer from more economic sanctions. And even if the financial help from abroad were given to Russia, it is unlikely to reach the destination and would dissipate in corrupted bureaucratic structures.

The opportunity remains though to go the “down up” way, relaxing the power of BMSC by decreasing the population’s subconscious belief in the authorities' supernatural powers. As history showed, authorities encouraged this subconscious belief in order to strengthen their grip over the people. Usually, they did this by showing miracles. For example, the Biblical character Aaron magically turns his walking stick into a serpent (Exodus 7:10). In the New Testament, Jesus expels demons from a madman, walks on the water, feeds 5000 people with five loafs of bread and two fish (Matthew 14:13), resurrects a dead mad and is himself resurrected.

The main problem therefore is to find the way to weaken the tendency towards BMSC, and thus to liberate the masses from compulsively compliant behaviour and make them capable of relying on their own critical thinking instead. The way of pushing the belief in the supernatural deeper down into the subconscious, which historically

Western Europe has gone through, for Russia is impossible. Not only because witch-hunting and burning people at stake is the thing of the past, but also because this way requires conditions which are absent in modern Russia - centuries of time and a fanatical religious zeal in the population.

A more realistic way is to weaken the source of the BMSC energy – the belief in the supernatural. How could this be done? We know that in modern educated adults their belief in the supernatural rests in the subconscious, so a direct onslaught with the aim to undermine this belief is unlikely to be effective. Besides, proclaiming the belief in the supernatural "a fallacy" would be telling a lie, since there is truth in this belief [59]. Fortunately, what needs to be targeted in this particular case is not the belief in the supernatural as such, but a certain kind of this belief – the belief in that demands and suggestions of authorities are sanctioned by god. For doing this, the method developed by psychoanalysis could help: Making a patient aware of the fact that he or lives under the spell of a certain hidden experience – "the complex". The result of this "assisted awareness" might lead to the dissipation of the "complex" (in our case – the people's tendency to unconditionally comply with the demands of authorities). In order to achieve such awareness, we need to relax the psychological defences – fear and shame - that prevent the belief in the divine power of authorities from becoming conscious. These psychological defences can be relaxed through a set of educational programs on magical beliefs in modern people.

First and foremost, *a widely spread sentiment should be overcome that magic is a dark force (the opinion of the Russian orthodox church) or the fallacy on the margins with clinical pathology (the opinion of official science and medicine).* Equally inadequate public image of magic is created by appearances on TV and in media of various "witches", "psychics" and other charlatans, who exploit the people's

subconscious belief in the supernatural for extracting financial and social profits. *In contrast to these distorted images of magic, public education could explain that magical thinking and behaviour is an inherent feature of the human mind.* In the logical plane, *magic is not an enemy but "a black swan" of science*. Each time we think about science we, consciously or not, at the same time have to think about something that science denies, and this something is magic. In the historical plane, magical thinking gave birth to science and keeps feeding science with creative ideas. Alchemy gave birth to chemistry, astrology preceded astronomy, and magic of numbers was at the foundation of modern mathematics. Gods that roamed the sky on sunny chariots became modern planes and spacecrafts, and wizards that could speak to people remotely turned into modern radio and television. Similarly, *the belief in the supernatural is not an opponent of modern religion, but an important component of the belief in the almighty god.* Without the belief of an ordinary person in that he or she could communicate with the god via a payer, that god is somehow supervising the person, loves the person and is ready to help, modern religion would be dead.

Second, *positive functions that magical thinking and beliefs plays in the everyday life should become widely known, as well as the ways by which magical thinking and beliefs can be misused by various organizations and individuals.* While magical phenomena are rare in the physical world, they abound in our psychological world. A magic spell cannot move a rock, but it can change our thoughts and feelings. The spell could elicit fear or hope, and these feelings could push us into action. In other words, much in our mental world obeys the laws of magic (see the previous chapters for more on this). Studies have shown that the belief in the supernatural could give a person the feeling of control over some events of his or her life [60]. Engagement with magical thinking could enhance divergent creative thinking in children [61],

increase the children's ability to distinguish fantasy from reality [62], and help the viewers better remember advertised products [63]. Discussing in the media unusual features of human psychology, such as the placebo effect [64][65] and the paranormal phenomena of the mind [66][67] could also help. When in the Russian culture *the understanding becomes established that the magical impacts of a symbol, image and poetry on the human mind and behaviour are not just metaphors but realities, then the fear of magic as something akin to the dark forces will fade away.*

At the same time, people need to become aware of the fact that, along with positive uses, magical beliefs could also be misused to manipulate with mass consciousness. Not only leaders of controversial religious cults, commercial advertising and charlatans of all sorts who present themselves as healers and fortune tellers, but peoples' own democratically elected governments and presidents could use the peoples' subconscious magical beliefs with the aim of extracting social, political and financial gains. *The people should realize that their subconscious belief in the divine powers of authorities undermines their critical thinking and weakens their ability to consciously participate in political life of their country. This awareness could diminish the people's tendency towards BMSC and make them more self-conscious, responsible and politically active citizens.*

The aforementioned educational efforts alone *could not drastically change the Russian people's "national character" and their adherence towards BMSC.* For such a change a steady and slow improvements of all aspects of life – economic, social, juridical and political – is needed. It is hard to tell how long such improvements might take. But the educational efforts could certainly contribute towards this change.

Conclusion: Moving forward will be hard, but not impossible

So, the analysis brings us to a somewhat disappointing but not completely hopeless conclusion: Diminishing the grip of BMSC requires steady educational efforts in the media, the improvement of general well being of the population, and a more effective struggle with corruption and organized crime. A one step jump from Type 2 to Type 3 BMSC is hardly possible. Yet it is important that the people know about the subconscious belief in the supernatural and how this belief gives rise to BMSC. To know this is important in order to understand that the most difficult obstacle to Russia becoming a prosperous democratic country is not the intrigues of internal or external enemies, but is hidden inside the minds and hearts of the Russian people.

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Chapter 8. Watching the Supernatural: Educational Effects of Magical Thinking

Abstract

The chapter analyses the role of magical thinking in children's education and psychological development. The following problems are discussed: Do children really believe in magic or do they simply play pretend games with magical content? Is the children's interest toward magic stronger or weaker than their interest toward new and exciting physical phenomena? Is children’s belief in magic an impediment to their science education? Can children's magical thinking be used to enhance their cognitive skills? Studies have shown that preschool children really believe in supernatural characters and events. Preschool and elementary school children showed a

significantly stronger interest toward magical events than toward equally new and exciting physical events. Experiments supported the assumption that showing children a movie with supernatural magical characters and events facilitates some useful cognitive skills (such as visual comparative analysis and divergent creative thinking) to a significantly greater extent than showing movies with equally interesting and exciting natural characters and events. Finally, the experiments revealed that viewers subsequently recognize commercial brands that were placed within films with magical content more frequently than commercial brands placed within films with equally interesting and exciting non-magical content. Opportunities are discussed of using magical thinking at a classroom. The possibility of creating «alternative handbooks» - the handbooks in which objects and events would follow the laws of magic and not of science – is also discussed.

Problem

> Imagination is more important than knowledge.
>
> Albert Einstein [1]

Although the world of children today is full of magic and fantasy (e.g., fairy tales, cartoons, books, and computer games in which the laws of science are frequently violated), relatively little in known of the role that magical thinking plays in children's development and education. Thus we know that even before children learn to read they like listening to fairy tales and watching cartoons with magical events. For example, ever since my son was 1.5 years he enthusiastically watched the marvellous cartoons with the magical character «Loontic» (a creature from the Moon). I have to confess that my wife and myself enjoyed watching these cartoons too. For more

advanced ages there exist such masterpieces of literary magic as fairy tales by Brothers Grimm and Hans Christian Anderson, “The Chronicles of Narnia» by C.S.Lewis, «The Lord of the Rings» by J.R.R.Tolkien, J.K.Rowling's Harry Potter series, and the peak of magical fantasy – «Alice's Adventures in Wonderland» by L. Carroll. And what about children's role-play? Games of pretend abound with magical events. In play, a Lego block can turn into a piece of cheese and a wooden stick into a running horse. When engaged in a game of pretend, children can fight monsters and dragons, speak with trees, and breathe in water like a fish. Most adults encourage the children's fantasy games and beliefs in Santa and fairies, by pretending that magical events and characters really do exist. The onset of the gadget world in the XXI century made access to the magical Wonderland still easier. In the digital realms of Minecraft or Roblox children can create the whole new worlds by touching a screen of an i-phone with their fingers.

Regarding the role of fairy tales in children’s psychological development psychologists’ views vary. Thus, American psychologist Bruno Bettelheim argues that fairy tales help children understand inner conflicts that the children experience in their spiritual and intellectual development, and resolve these conflicts in a symbolic plane. Fairy tales also enrich the children’s knowledge of life and help the children cope with the fears of the horrible [2]. At the same time, some psychologists suggested that children's early representations of the world could be an obstacle to learning science concepts later in life. For example, 4-year-olds' naive belief in that all things in nature exist in order to serve people's need (e.g., «a lion is for a zoo», « a cloud is for rain») provides a fertile soil for these children's later belief in creationism («the belief that animals and people were created by god») and resistance to the scientific theory of evolution through natural selection [3]. Extending this argument

one might think that fairy tales and games of pretend, which incorporate magical events, draw children away from reality and inhibit the children's ability to absorb concepts of science.

A recent neurological study has shown that listening to an extract from the Harry Potter series that described supernatural magical effects was associated with a stronger activation in certain parts of the brain (such as left amygdala) than listening to a similar text without supernatural events [4]. This might suggest that exposing people to supernatural versus not-supernatural contexts can also have different effects on cognitive functioning, including learning. The problem is to find out, which of the two types of information – ordinary or supernatural – facilitates learning. The existing evidence regarding the effect of fantasy on learning is mixed. Some evidence suggests that framing cognitive tasks within a fantasy context facilitates thinking. For example, studies showed that embedding a logical task within the make-believe imaginary context improved 4- and 6-year-old children's ability to make correct logical inferences from counterfactual premises, as compared with the tasks presented within a normal matter-of-fact context [5]. Other research confirmed the facilitative effect of fantasy contexts on children's performance on cognitive tasks [6][7][8][9][10][11][12]. At the same time, there is also evidence suggesting that fantasy context can be less favourable for cognitive functioning than real life context. Thus, research revealed that preschool and elementary school children were less likely to transfer solutions from the stories about fantasy characters to real life tasks than from the stories about real people to real life tasks [13] [14].

Altogether, the reviewed studies arise the problem: Keeping in mind children's psychological development, how should we treat the young children's fascination with

magical things? *Should we encourage these beliefs as something that benefits the children's emotional and cognitive development, or should we disapprove of these beliefs because they might impede the children's ability to learn concepts of science?*

In order to straighten the problem up, let us break it down into three simpler problems. First, it is necessary to answer the question: "Do *preschool children really believe in magic, or do they simply pretend that magical events and characters are there, without really believing in this*? Clearly, if children believe that magical events they see in movies or read about in books can happen in real life, then the impact these events make on children's thinking, perception and memory is likely to be greater than if the children think that magical events are just fantasies. This assumption was partially supported by experiments. These experiments have shown that when children believed that the TV clip, in with characters behaved badly, was made up, they were less prone to imitate the characters' violent actions then if the children thought that the clip was a documentary, portraying events that had really happened [15][16]. By projecting these results onto the effect of magical beliefs on science education we can assume that if children don't believe in reality of magical events they play with, then playing with these events cannot possibly do any harm to the children's subsequent science education. If, however, the children believe that magical events are real, then the issue about the inhibiting effect of the belief in magic on children's scientific education deserves a more serious examination.

The second question to ask is: "W*hat kind of books and movies elicit a stronger interest in children: books and movies with fantastical magical events, or books and movies with unknown and interesting physical events?"* If books and movies with fantastical magical events are less interesting to children than books and movies with

physical events, then the children's engagement with magical content cannot be a cognitive impediment to learning science. The reason is that books and movies with magical events simply won't be able to compete for the children's interest toward books and movies that contain fascinating scientific effects. If, however, books and movies with magical events proved to be more interesting than books and movies that depict scientific events, then the children's interest towards magic can indeed step on the way of children's science education.

Yet even if the answers to the aforementioned questions showed that children believe in magic and are more interested in magic than in science, the third question can be asked: "*Instead of viewing the children's fascination with magic as an obstacle to science education, couldn't this fascination be used to boost their learning of science?"* Indeed, magical events, by definition, are reflections of scientific events in the «mirror of the supernatural». While watching magical events or reading about such events, children might ask themselves questions: "Why can't a person become invisible in the real world?" "What laws of nature prevent me from riding the broomstick in my back garden?" As a result, watching a movie with magical events, instead of diverting children from thinking about science, could make the children's reflect upon the laws of nature that render magical events supernatural in the real world. Perhaps, engagement with magic could also have other, less specific positive effects on children's thinking, perception and memory.

Let us try to answer the aforementioned questions one by one, and then return to the main question asked in this paper: *"Is children's early belief in magic an impediment to science education?"*

Magical thinking and belief in magic in children

As argued in the Introduction, scientific thinking follows the laws of formal logic and is based on the assumption that the world is built on the universal and unchangeable laws of nature. By contrast, magical thinking allows for instances when these laws are violated. When watching movies or reading stories with magical events we inevitably and unwittingly engage in magical thinking. Because magical thinking unfolds in the domain of the imagination, it does not necessarily challenge the belief in that the real world strictly conforms to the laws discovered by science.

Nevertheless, as shown in the previous chapters, some people believe that supernatural (supernatural) things can happen in the real world. This divides people in two categories: *Those who imagine the supernatural without really believing in it, and those who believe that the supernatural phenomena exist not only in their imagination but can in fact be real*. The question therefore is to find out to which of these two categories preschool children belong when they play with the supernatural. Do they believe in magic or do they only play with magical events and characters without really expecting these events and characters to exist in the physical world?

Studies on children's thinking revealed that in their reasoning children often exhibit a belief in the supernatural. Jean Piaget reported that Swiss children at the age of 4 to 7 years often attributed the abilities of thinking and feelings to inanimate objects [17]. For instance, the children believed that a twisted rope «wants» to unwind itself because «it knows that it is twisted». The children also thought that their magical actions could have a direct effect on the real world. Thus one child said that if he sacrificed his favourite toy then his sick mother would get better. We should bear in mind that Piaget conducted his interviews with children around 90 years ago and today children of the same ages could answer his questions differently. Another

limitation of Piaget's studies was that he only studied children's verbal judgements about magic, without testing of whether the children's verbal magical beliefs have any impact on the children's behaviour. It is therefore necessary to examine whether modern children, like those tested by Piaget, are prone to magical thinking, and if they are then whether they really believe in magic.

In order to answer these questions 4, 5 and 6 year old children in Moscow were told a story of a magic box that could turn pictures of objects into real objects shown on the pictures if three magic words were spoken. Most children denied that it was natural in the real world. However, when the experimenter left the children alone in the room, 90% of them tried to convert pictures into objects and were very disappointed when their magic words didn't work [18]. In another experiment children of the same age groups were told a story of a girl who was given a small table that had a magical ability to turn toy animals into real ones if the toys were put on the table. Again, when the children were asked whether a table like that could exist in the real life, only one 4 year old said «yes». However, when the children stayed alone in the room, which had a real small table and toy animals available, a great majority tried to put toys on the table. The table and one of the toys had magnets hidden inside. When a toy lion started to move on the table as if by itself, only a few of the children behaved as «little scientists» would do: They tried to find out the mechanism of the movement or looked for the wires connecting the table to the mains. The majority of the children however either left the room in the fear that the lion was really coming to life or used the «magic wand» they had been given in order to stop the conversion process. A similar belief of pre-schoolers in magic was also found in British [19] and American [20] [21] children. Studies revealed that under certain conditions young children could even be made believe in a novel fantastical entity they had never heard of before [22]. These

studies have shown that at the age of 4 years most modern children understand that the supernatural can only exist in fairy tales. This knowledge, however, remains only theoretical; in practice, most 4-year-old and even 6-year-old children behave as if they believed that the supernatural could happen in the real life.

Altogether, *the studies confirmed that modern pre-schoolers not only play games of pretend with magical content, but also believe in magic.* This brings us to a conclusion that the children's belief in magic can indeed create a competitive alternative to their belief in science. But is the children's interest towards magic really that strong? Is this interest comparable with their interest towards unknown physical events?

Magic versus physics: What is more interesting?

It is common knowledge that human and animal leaning can be based on a variety of motives. For example, psychologists distinguish between external and internal motivation [23]. External motivation is grounded in our basic needs, such as the need of food or self-preservation. One more external motive can be a child's the need in positive relationships with close adults. Finally, a child's desire to play can be used as external motivation for learning as well. For example, children can be asked to do their homework first and then be given a gadget to play their favourite games.

A more effective way to motivate children to learn is to make the learning interesting in its own right. Studies have shown that internal motivation for learning positively correlates with both children’s scores on special tests and their marks at school. On the contrary, external motivation negatively correlates with school achievements [24]. In other words, the more interesting a certain learning content is for a child, the easier

it is for the child to learn and remember this content. The question is, *what kind of events makes a more interesting content for children: Supernatural events or the equally interesting and novel natural events?* What attracts the children more: Magic of physics?

For such comparison to be valid one has to secure that the supernatural and the natural events were equally novel for the children. Indeed, one of the factors that make a subject interesting for the child is the subject's novelty [25]. However, novelty alone is not sufficient in order to elicit exploratory behaviour in children; in order something could become an interesting object for exploration it has to not only be novel, but also attractive [26]. Thus, novel foods do not elicit in people a desire to taste them if these foods look unattractive or dangerous for consumption [27][28]. The feature that makes new phenomena attractive to explore is the phenomena's subjective value to the person, e.g. their capacity to satisfy the person's basic needs. One might assume that *observing a supernatural event is subjectively more valuable for a person than observing a novel natural event.*

Indeed, the ability to change objects with the help of magic words makes a child an incomparably more powerful person than the ability to change the same objects with the help of physical devices. Magic opens to the child an opportunity to become a powerful person here and now, whereas science demands years of hard work and training. It is not a coincidence that various forms of magic (e.g., the magical feats of Santa Claus or the Evil Fairy, astrology, telepathy and magical healing) have such a powerful attraction to both children [29] and adults [30][31]. The difference between a supernatural event (e.g., the ability to move inanimate objects by a thought alone) and a novel natural event (e.g., the ability to move objects by means of unknown

physical fields) is that *the former is not only new but also more valuable for the observer than the latter.*

In order to find out which of the two events – a magical event or an equally novel and attractive scientific event – is more attractive for children and adults to explore, an experiment was designed [32]. Participants were shown an apparently supernatural event: An object (e.g., a postage stamp), which had been placed in an empty wooden box in the participants' full view, suddenly changed its shape (e.g., became cut in parts or half-burned). One group of participants observed this event after the experimenter said a «magical incantation», and the other – after the experimenter switched on and off again an unknown physical device that produced light and sound effects. Next, the participants were offered to view this event one more time. This time, however, the object placed into the box was something of value to the participants – a nice picture that the child had been rewarded with earlier in the experiment or, in the case of adults, their driving licenses. The aim of this experimental manipulation was to find out participants of which of the two groups would be more willing to run the risk of loosing their valuable objects – those who were led to think they had become witnesses of a real magical event or those who believed the event had been caused by an unknown physical device?

The results showed that a significantly larger number of both children and adults exhibited their readiness to put their valuable objects at risk in the «magical event» group than in the «novel physical event» group. This suggests that tendency to explore the supernatural (e.g., reading books or watching movies with magical content) can indeed be a stronger incentive for learning than tendency to explore novel scientific effects. Interestingly, some teachers at preschool and elementary

school levels intuitively come to this conclusion, by converting the learning content in the form of games with magical content. For example, a typical exercise on teaching language at primary schools in England is sentence completion: A teacher covers part of a sentence by a piece of paper and asks children to imagine that they are wizards that can see through non-transparent screens. Clearly, this way of instructing children makes them more motivated to learn than does a direct instruction. But is motivation to learn the only natural benefit of children's fascination with magic, or could there be other, less obvious positive effects of children's engagement with magical thinking?

In order to find out whether children's interest towards magic could help improve the children's useful skills in the domains of thinking, perception and memory, a series of experiments was designed.

The natural and the supernatural as stimulators of learning

Altogether, the problem of the experimental study can be put as follows: Observation of what kind of events – supernatural or natural ones – will have a stronger effect on children's ability to learn useful cognitive skills? For example, seeing which of the two phenomena will help the children better reflect upon and understand the law of gravitation – an apple jumping up from the floor on its own, or an apple falling down on the floor?

At first glance, seeing the natural event would be more effective for understanding the law of gravitation than seeing the supernatural event, because the natural event conforms to the law of gravitation and the supernatural event doesn’t. However, the opposite expectation is also plausible, and it is based on the fact that human thinking is not an isolated psychological faculty and works in conjunction with memory,

imagination and emotions. For example, if a child is shown a natural object, e.g. an image of a horse or a bird, the child's perception and memory will be activated, but the child's thinking, emotions and imagination will remain unchallenged. The child knows what the horse and the bird are, and his or her perception simply places the familiar images onto the appropriate «shelves» in the child's «mental library». If, however, the child is presented with a winged horse flying in the sky, the child's reaction is likely to be different. The sight of the supernatural creature is a challenge to the child, and the child's thinking, emotions and imagination are immediately engaged. Imagination draws from the «mental library» the contrasting natural images (i.e., the images of a horse and a bird); emotions make the child feel surprised; and thinking says: «the winged horse is a supernatural entity because horses don't have wings and are too heavy to fly». In other words, *in contrast to natural images that activate only the child's perception and memory, supernatural images activate the whole bunch of the child's cognitive processes* (see Figure 7). Similarly, one might expect that presenting the child with the image of an apple flying in mid-air on its own will make the child reflect upon the law of gravitation and understand this law to a greater extent than demonstrating the image of an apple falling from the tree branch on the ground.

Figure 8.1 about here

In order to examine, which kind of phenomena - natural or supernatural ones - would have a stronger impact on children's useful cognitive skills, a series of experiments was designed.

Can elephants fly? Magical thinking as a stimulator of visual analysis

To compare the impact of natural and supernatural entities on children's cognitive abilities, it is necessary first to establish whether the children can understand the difference between the natural and the supernatural. Research has shown that 3 to 5 year old children poorly distinguish between pictures of real and fantastical animals [33]; only 11-year-olds showed the ability to contrast real and fantastical animals comparable with that in adults [34]. The question arises of why preschool and elementary school children find it so difficult to distinguish pictures of real animals from those of fantastical ones: because they cannot compare the pictures between themselves (deficit of visual analysis skills) or because they don't understand the difference between fantastical and real animals (deficit of understanding the difference between fantasy and reality). In order to answer this question, researches replaced the pictures with verbal description of real and fantastical entities. For example, children were asked whether a certain entity (e.g., a clown or Santa) could be in many different places simultaneously. It turned out that when visual analysis was unnecessary, even 4- and 5-year-olds were able to successfully distinguish between real and fantastical entities [35]. This study suggested that children at the age of 4 years begin to understand that fantastical entities have abilities that violate known laws of physics, biology and psychology. The fact that children below the age of 11 years struggle to distinguish between pictures of real and fantastical entities can be

explained not by the lack of understanding the difference between fantasy and reality, but by the immaturity of visual analysis skills.

One way of improving the children's ability to visually differentiate between pictures that show natural and supernatural entities could be exposing children to a movie with magical entities and events. As argued above, watching a supernatural entity (e.g., a flying elephant) makes the children visually represent the contrasting natural entities (e.g., an ordinary elephant and a regular bird) and reflect upon visual features that distinguish the supernatural (fantastical) entity from its natural (real) counterpart(s). In contrast, observing a natural entity (e.g., an ordinary elephant) doesn't provoke the child to make such a comparison; indeed, it only makes the child recognize the given animal (e.g., an elephant) and keep it for a time in his or her working memory. In other words, watching a movie with supernatural entities is an exercise on the ability to distinguish between visual images of the natural and the supernatural, whereas watching a similar movie with natural entities is simply training on the ability to recognize visual images of familiar objects.

In order to find out whether watching a movie with magical content will indeed enhance the children's ability of visual analysis to a larger extent than watching a similar movie without magical content, participants (6- and 9-years-old school children at Lancaster, England) were shown two video clips. Both video clips contained extractions from the movie «Harry Potter and the Philosopher's Stone». The clip with the supernatural contained phenomena such as riding a broomstick, a talking serpent, people becoming invisible, and other events that violated known principles of physics, biology and psychology. The clip with the natural contained the same characters as the clip with the supernatural, but no supernatural magical events. Eight

independent raters scored the clips on such scales as interest, visual and sound effects, speed of the events' change and presence of supernatural events. On all of the scales, except presence of supernatural events, both films were given approximately equal scores. Children of the experimental group were shown the clip with the supernatural, and children of the control group – the clip with the natural.

Before and after exposure to the movie clips the children were administered an interactive computer test on their ability to distinguish between supernatural and natural characters and events [36]. In the test, a child was shown a display that contained a picture on the top, and two pictures at the bottom. The pictures portrayed natural and supernatural characters and events. The child was instructed as follows: «Look at the picture on top of the screen and decide whether such event (a creature) can or cannot be in the real world. Out of the two pictures at the bottom of the screen click on the one that matches the picture on the top». There were 42 trials altogether. The test allowed assessing the child's ability to distinguish natural (not fantastical) entities from supernatural (fantastical) ones.

Results indicated that before exposure to the video clips children of both groups scored approximately equally on their ability to distinguish between natural and supernatural visual displays; after the exposure, children of the experimental group scored significantly better than before the exposure, whereas children of the control group did not [37]. The study supported the hypothesis *that exposure to supernatural magical creatures and events facilitates children's ability to distinguish between visual fantastical and realistic displays, whereas exposure to natural creatures and events does not.* This confirms that engaging children in magical thinking can be used as a method of improving the children's visual analysis skills. This ability is necessary

for most modern educational methods that involve computer graphics and other means of visual representation of the content.

Magical thinking as a stimulator of creativity

In another study the task was to examine the impact of watching a movie clip with supernatural entities and events on children's creative thinking, by comparing this impact with the impact of watching a similar movie clip that contained no supernatural entities and events. *Divergent creativity* is the ability of finding non-standard new ways of solving a problem that allows for multiple solutions. Since supernatural events violate known laws of science and thus create new and original ways of solving familiar tasks, *observing supernatural events can be a way of facilitating divergent creativity*. For example, if the task is to move from one city to another, then the ordinary ways of solving this task could be going by train, by car or on a horse; but when children are shown a movie in which people use a dragon, a magical carpet or a broomstick in order to move from one place to another, this can make the children start searching for unusual ways of problem solving and thus stimulate the children's divergent creativity.

Accordingly, the aim of the study was to find out whether exposing children to a movie clip with supernatural events will affect the children's creative thinking to the same or greater extent than exposing the children to a movie clip with equally interesting and engaging natural events. Four- and 6-years-old children in a primary school in Greater London were divided into experimental and control groups. The experimental group was shown a movie clip with magical events and the control group – a movie clip without magical events; the movie clips were matched for interest, visual and sound effects. Before and after exposure to the movies the children

were individually tested on divergent creativity. One of the tests was Torrance's «Creativity in action and movement test», which included tasks such as inventing as many as natural uses of a paper cup (e.g., as a storage for pencils) [38]; the other test was drawing a supernatural entity (a plant, a car, a person) [39]. Results indicated that before exposure to the films children of both groups exhibited creativity to an approximately equal extent; after exposure children of the experimental group scored significantly higher on most creativity measures than children of the control group (see Figure 8). In another version of this experiment the same method was used, with a few minor modifications. Along with being tested on creativity, 6- and 8-years-old children in a primary school in Shropshire, England, were also tested on their belief in reality of magical events. Like in the previous experiment, after, but not before exposure to the movies children in the experimental group exhibited greater creativity than children in the control group. However, there was no a significant difference between the groups on children's belief in reality of magical events [40].

Figure 8.2 about here

Altogether, both experiments showed that *exposing children to a movie with magical events increases creativity in children to a significantly larger extent than exposing the children to a movie with equally exciting but non-magical events.* At the same time, the experiments indicated that exposing children to the movie with magical events did not increase the children's belief in reality of magical events. This suggests

that exposure to supernatural events can be used for educational purposes without such exposure increasing the children's belief in magic.

Magical thinking as a stimulator of memory

One more study compared the effects of the natural and the supernatural on memory [41]. The study was based on the fact that TV adverts often include scenes that violate known laws of physics, biology and psychology (e.g., a piece of chocolate turns into a little person, and a moving car becomes a running jaguar). Arguably, this is done under the assumption that advertised brands will be remembered better if they are placed in the context of magical creatures and events than if they are placed in the context of non-magical creatures and events. However, thus far there has been no an experimental verification of this assumption.

Accordingly, the aim of the study was to find out whether commercial products placed in the context of supernatural events are remembered better than similar products placed in the context of natural events. British adolescents and adults were shown two films composed of TV advertising clips. Film 1 included clips advertising commercial brands (e.g., Mini Cooper, Levi, Paco Rabanne and Pepsi Maxx) put in the context of supernatural events, and Film 2 had similar brands placed in the context of equally interesting and exciting natural events. Independent scorers assessed the films on such scales as presence of magical effects, interest, emotional attractiveness, and visual and sound effects. The films did not differ significantly one from the other on all of the scales but presence of magical effects. Participants were individually shown both films (the order of the demonstration was randomised) and then asked to recognize advertised brands in the list of brands in which the advertised brands were randomly mixed with similar brands that had not been included in the films. For every

correctly recognized brand a score was awarded, and for every incorrectly recognized brand a score was subtracted.

The results indicated that both adolescents and adults recognized a significantly larger number of brands from the film with magical context than from the film with non-magical context. This confirmed the assumption that *associating advertised commercial brands with magical events helps to increase subsequent recognition of these brands by the viewers.* A plausible explanation of this effect is that supernatural events engaged the participants' emotions, thinking and imagination and thus helped to imprint the brands associated with these events in the participants' memory. In contrast, natural events did not stimulate the participants thinking and imagination to exactly the same extent as did the supernatural events; as a result, the participants' recognition of commercial brands associated with the natural events was not as good as their recognition of the brands associated with the supernatural magical events.

Conclusion: What can magic teach us?

This chapter began with the questions: Do children really believe in magic or do they only pretend that magic exists in the real world? Is children's interest towards magical phenomena stronger than their interest towards new physical phenomena? Could children's magical beliefs be an impediment to their science education? Could magical thinking be used to improve children's cognitive skills?

The reviewed studies suggest that preschool and elementary school children do indeed believe in magic. The children also show a considerably stronger interest towards exploring magical events than towards exploring unknown physical events. Further, it turned out that exposure to a movie with supernatural events stimulated some of the

children's cognitive skills to a significantly greater extent than exposure a movie with equally interesting and exciting natural events. Finally, commercial brands placed into the context of supernatural magical events were subsequently recognized significantly better than commercial brands placed into the context of natural events. The explanation offered to these effects was that *exposure to the natural engages a narrow circle of psychological functions (mostly perception and working memory), whereas exposure to the supernatural activates the whole spectre of psychological functions (perception, memory, emotions, imagination and thinking) and thus facilitates the children's cognitive skills to a significantly greater extent than exposure to the natural.*

English literature for children often involves magical thinking. For example, Raymon Briggs' book «Fungus the Bogeyman» [42], recommended for reading in primary school Year II, portrays a magical character "Bogeyman" (a humanoid mould), which has an unusual body built, sleeps only in a dirty bed, keeps its cloths and shoes in cold water and generally does everything opposite to how things should be done. The studies reviewed in this paper suggest that such intuitive uses of magical thinking by writers are indeed psychologically justified. In principle, *it is possible to create alternative handbooks on scientific subjects, in which familiar things would follow not the laws of nature but the laws of magic instead.* The alternative handbooks would not replace regular handbooks but rather complement them, helping the students better reflect upon the laws of nature via "compare and contrast" method [43][44]. Jean Effel's «The Creation of the World» cartoon caricature book can be an example [45]. The biblical story of how the world was created is different from the story science tells us, yet these two stories share some common features. For example, the Big Bang theory is similar to the biblical story in that it portrays the universe as appearing

from nothing (a point of singularity) and expanding very fast; this rapid expansion conformed not to the laws of physics but to the laws of magic [46]. Discussing with children common features and differences between scientific and biblical versions of the origins of the universe or the origins of species might make science lessons more interesting.

In reality, such alternative “handbooks” already exist, though not in the real life but rather in fiction books and movies. For example, some parts of the «Harry Potter» series can be used for teaching science. When watching or reading through the episode of Harry and friends going through the stone wall in order to get into the magic land, the children could be asked of how can the stone wall let the people through itself while not letting light through itself at the same time? When watching the episode with Harry wearing the cloak of invisibility it might be interesting to discuss whether the hero himself could see anything at all; indeed, in order to be invisible a person has to be transparent and let all the light through his or her body, but if the person's eyes do not reflect light, the person can't extract any information from the light and therefore is unable to see anything. When the characters ride broomsticks, it could be interesting to ask the children how it is possible to maintain equilibrium at turning points while sitting on a narrow rod and without having any fulcrum; it might also be useful to discuss issues such as gravitation, inertia and centrifugal forces. When Harry speaks Parseltongue to a boa constrictor, one could discuss whether the communication is happening through sounds, visual signals or telepathically via a direct «mind-to-mind» transfer of messages. Discussions like that could help the children reflect upon the known laws of physics, biology and psychology better than direct instructions in those laws.

So, does the children's early belief in magic inhibit their ability to learn the laws of science? In the light of the studies reviewed in this paper the answer is no. The belief in magic and the belief in science are not mutually exclusive; they can peacefully coexist in one mind. Consciously, most modern adults believe in science and not in magic. However, in specially designed psychological experiments [47] or in some existential situations of high stress [48] a rational person can discover that his or her early beliefs in magic and miracles are still there. Research has shown that in adults their subconscious belief in magic coexists with their conscious belief in science and performs certain important functions [49]. As for children, their early belief in magic and fascination with magical things could be used to enhance their cognitive development. Far from being just the «wrong vision of reality», children's magical thinking opens new and exciting opportunities for improving cognitive skills and making science education more effective and interesting.

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Chapter 9. Games with the Supernatural: Magical Reality in the Everyday Life

Abstract

Along with giving a brief summary of the ideas discussed in the book, this concluding chapter raises the issues which were omitted or only touched upon in the previous chapters: What is magical reality? What domains of modern life does magical reality penetrate? Why is magical reality important for many people today? What psychological consequences does the engagement with magical reality entail? In ancient times and in the Middle Ages religion, witchcraft, astrology and alchemy were the main "wormholes" that opened to people access to magical reality. In the time of Renaissance, art and literature joined the club. In the XIX and XX centuries new ways of contacting magical reality emerged – cinema, the spiritualist movement and parapsychology. Finally, in the end of the XX and in the beginning of the XXI centuries there appeared interactive computer games and the Internet. Psychological studies have shown that in modern people the belief in magical reality didn't vanish, but descended into subconscious. This hidden belief permeates many domains of

modern life – economics, politics, medicine, morality, education, entertainment and theories of modern physics and astronomy. Why do children become addicted to computer games? Why do rational people, when faced with choices in economics, often follow the laws of magic rather than common logic? How does it happen that educated people voluntarily follow political ideas, which the people consciously reject as contracting their own interests? What psychological mechanisms underlie the placebo and homeopathic medicine? Where do suicidal terrorists take their courage to commit actions of self-destruction? Why do some people go for moral choices and sacrifice their private interests even when there is no surveillance? How come some scientists call the work of the brain magical? How is it possible that in the beginning the whole universe was smaller than a grain of sand? What is in common between "chemistry" and falling in love? Answers to these and other questions are hidden in the subconscious belief of modern people in the supernatural. The rapid advance of interactive electronic devices makes the imaginary world of the supernatural easily accessible, and the effect of the magical world on a variety of domains of modern life expands with increasing velocity.

Problem

> All, all that threatens to destroy
>
> Fills mortal hearts with secret joy
>
> Alexander Pushkin "A Feast During the Plague"
> (Translated by Nancy K. Anderson [1])

One of the functions of children's role play is overcoming the inferiority complex: In play, children temporarily forget that they are small and weak, and get the opportunity to rebuild the world as they please by affecting people and objects in a magical way. The computer games "Minecraft" and "Roblox" can be an example. By immersing

themselves into the games, children obtain powers which are truly magical: With a motion of a finger they can create cars, spaceships, gardens, palaces and the whole cities, both on land and underground. In endless labyrinths of underground tunnels the children can travel, chase and kill bad guys or hide themselves from monsters. All is accompanied by nice music; all is full of bright colours and shades of grey. Pulling the children out of this magical world and back into the real world, where every achievement requires efforts and the children must obey rules, brings disappointment to the children. Quite understandably, they protest.

As a result, there appeared a new psychological phenomenon: The addiction to the magical reality of computer games. In some respects, this addiction is similar to the addiction to psychedelic drugs. In the altered state of mind caused by LSD a person can get the intensive experience of freshness of the world and oneness with the surrounding objects. While playing computer games children may have similar experiences. It is quite possible that in this state of consciousness the children learn faster and remember new ideas better than in the normal state of mind. But the addiction to the digital magical reality is also potentially dangerous. This addiction affects the children's thinking style: Children become habituated to receiving information in the form of chunks of rapidly changing visual images, instead of distinctive symbolic structures, such as written words and mathematical equations. The number of children who enjoy reading books is plummeting. Besides, we don't know yet whether this addiction doesn't cause some delicate changes to the brain chemistry and what the long-term consequences of this addiction are. It is possible that the World Health Organization will recognize "gaming disorder", which includes addiction to computer games, as a mental health condition, in its next revision of the International Classification of Diseases [2]. This may or may not happen, but one

thing is clear: In children's lives *there appeared a new and unexplored activity that can plunge children into the depths of magical reality faster and more effectively than the traditional ways of playing with magic – fairy tales and pretend games.*

Computer games are just one type of plays with magical reality. Intentionally or unintentionally, in modern industrial cultures people play a variety of games with magical reality on a regular basis. Easy access of modern people to magical reality, which is no longer controlled by religion, raises important questions. On what domains of modern life does magical reality trespass? What motivates people, who live in the world designed by science, to play with magical reality? What psychological consequences can the involvement with magical reality entail? These and other issues will be discussed in this chapter.

Wonderland

Magical reality, which in this chapter will be referred to as Wonderland, is similar to geometry on a sphere. In such geometry the postulates of Euclid geometry are suspended: Parallel lines can cross, and the sum of the angles of a triangle can be more than 180 degrees [3]. Likewise, in Wonderland the known laws of logic and nature can be violated: A part of a whole can be equal to the whole, a statement can be both true and false, time can go backwards, horses can have wings and fly, people can get to other universes and little children can solve advanced problems of high math. But Wonderland is not the land of chaos; it has laws and phenomena of its own. One of the laws of Wonderland is «the law of contagion». According to this law, two objects that are physically unrelated one to the other can have a magical bond between themselves, which lasts forever and acts instantly on a distance. For example, if a wizard casts a magic spell and burns the piece of cloths of the person to whom the

wizards intends to inflict harm, then the target person is supposed to get ill or even die. In Wonderland a thought can instantly come true (the direct “Self over matter” magical phenomenon). In the everyday reality, if we decided to build a house we have to get some bricks and other construction materials, make a plan, lay down a foundation and do many other things before the house can take its physical form. By contrast, in the supernatural reality of Wonderland we can build a palace by saying a magic spell and wishing the palace to appear (see Chapter 4, Table 4.1 for more on the laws and phenomena of magic).

Sometimes we get into Wonderland in our dreams. Indeed, in dreams we can see our deceased relatives, speak with animals and fly in the air like birds. But many of us like to play with the supernatural in the waking state of mind as well. We enjoy watching films with magical content (e.g., «The Lord of the Rings» or «Harry Potter» series), reading books that depict magical events (e.g., «Master and Margarita» by Mikhail Bulgakov), and looking at art objects with include magical characters (e.g., paintings by Dali, Picasso or Magritte). The name for this kind of games with the supernatural is *magical thinking*. Because magical thinking unfolds within the domain of imagination, it peacefully coexists with our belief in science. In the Western world today most people view the belief in Wonderland to be a remnant of ancient history; in a popular view, only small children and a limited number of superstitious adults take magic seriously.

However, psychological studies of the recent decades have shown that deep in the subconscious educated adults still believe in the supernatural [4][5]. For example, according to the law of contagion, a warrior’s weapon is magically linked to its owner and can pass the owner’s power and military skills to another person who took

possession of the weapon. An example can be found in Russian folklore, where a sword, which belonged to a great warrior, keeps the warrior's power even after the warrior's death and can pass this power to a new owner. With the aim of examining whether this law works in the mind of modern educated adults, in a recent study participants (university undergraduates) were given a golf putter and told that a professional golfer had owned it [6]. The results indicated that these participants not only were more successful at putting the ball into the golf hole than the participants who had been told that their putter had just been purchased in a store, but they also perceived the size of the golf hole to be larger. This showed that the belief in that a tool can magically transfer the skill of its owner to another person is indeed present in the minds of modern adults; more important, this belief works by facilitating the performance of those who think that their tool earlier belonged to a person who used this tool successfully. Other studies, reviewed in the previous chapters, showed that in certain conditions modern educated adults, who initially denied their belief in magic, in the course of experiments changed their minds and consciously acknowledged their belief in the supernatural [7][8].

Interestingly, people can attribute magical powers not only to professional witches, but also to other influential individuals, such as scientists, politicians, and medical doctors. This subconscious belief of modern people in magic opens the opportunity of manipulating the people's minds, with the aim of extracting political, social and economic gains (see Chapter 7). Let us consider how manipulating mass consciousness based on people's magical beliefs works in some domains of modern life.

The magic of economics

The popular sentiment «free cheese exists only in a mousetrap» is not a joke but a law of economics, as unbreakable as the law of gravity in physics. Whatever nooks and crannies of Wonderland modern virtual realities bring us to, one thing stays unchanged – the “exchange principle”. One can ride a broomstick, be invisible, travel back and forth in time, turn people into stone, but one cannot get anything from another person without giving the person something in return, even if this something is the donor’s feeling of moral satisfaction. Still, just like in dreams we sometimes cheat the law of gravitation, it seems to us that we can cheat the law of exchange and get the free cheese while avoiding the mousetrap.

Every year people get dozens of offers from companies: Buy our goods and your name will be put in a lottery where you can win thousands of pounds. I used to trash such offers but once decided to give it a try – just to see what would come out of this. Coincidentally, the choice of goods was not too bad. I purchased three small but useful objects and began to wait for a lottery win. Of course, I won nothing, but the offers from the same company kept coming, accompanied with the same catalogue. The only small variation happened when the offer came for the forth time; along with the catalogue of goods for sale and a standard set of papers to complete, a small poster came with my name and the company's gold medal shown on it. The instruction said «Proudly put on the wall» - a small carrot in the expectation that the suggestion would work again. It reminded me Pinocchio kids story. The marvellous but naive puppet boy named Pinocchio listened to the crooked cat and fox and planted his coins in the Miracle Meadow, hoping that the tree would soon grow, dripping with gold coins. Many people in the 1990-th Russia, including scientists with PhD titles, lost their savings in treacherous financial pyramids, which promised unrealistically high rates of capital growth. What does this fact prove? A simple truth: *Science education*

cannot protect a person from deception, which targets the person's subconscious belief in financial magic of the gurus of business (see Chapter 7 for a more detailed account of psychological causes of manipulation with popular consciousness).

Recall that according to the law of sympathy, things that resemble each other are magically linked one to the other (see Chapter 4, Table 4.1). For example, the rhinoceros horn looks like a penis and is used in some cultures as aphrodisiac. In 2002 American psychologists Kahneman and Tversky studied cognitive biases in economics [9]. One of such biases is the anchoring effect. The effect describes the common human tendency, when solving economic tasks, to rely on information that becomes a frame of reference despite it has no a rational connection with the tasks' essence. For example, if a person is asked to select a two digits number from a pool of numbers and then estimate the approximate cost of various goods (e.g., a brand of wine, a chocolate bar or a computer), then the person who had chosen a larger digit number would estimate the cost at a higher amount of money then the person who had chosen a smaller digit number [10]. Why do people do this? *Because unconsciously they follow the law of sympathy, according to which things tend to generate other things that are similar to them.* If a person selected number 11 then in the person's mind a bottle of wine simply can't cost 50 pounds, but if the person selected number 60 then it can. That is why it's easier for manufacturers to sell a dress which costs 160 pounds if the dress is labelled as having gone down in price from 200 to 160 than if the label only shows the real price of 160.

The aforementioned law of «contagion», which works mostly subconsciously [11], can also be used in order to handle a harsh situation in economy. In his book about the financial crash of the 1929 American economist John Kenneth Galbraith noted that

during the crisis American president Hoover deliberately employed the law of contagion to elevate the spirit of the population, by practicing meetings that had no practical significance [12]. He invited to the White House various VIP's (e.g., governors of the states, manufacturers, trade union leaders, businessmen, politicians etc.) who discussed issues of no significant value. Nevertheless, *in the eyes of general public the impression was building up that some important activity was going on, because the importance of persons involved in these meetings was magically transferred to the meetings themselves.*

In the same book Galbraith maintains that in the moments of crises and those closely preceding crises the influence of the "economics' guru" – the authorities in business – on the rise or fall of share prices rapidly grows. For instance, when director of "General Motors" John Rascob, while departing from USA to Europe in 1928, predicted the rise of General Motors' share prices in the nearest few days, the share prices of this and other companies indeed went up sharply the next day. In March 1929 a single optimistic prediction of the director of "National City Bank" John Mitchell helped to inhibit the fall of share prices. *What affect the market are not rational calculations but the public belief in special abilities of prominent financiers.* Science based predictions of Harvard University professors of economics had a smaller effect on public than arbitrary declarations of big figures in business. Interestingly, as the crisis deepened in the following years, nobody accused the bosses of business of wrongly optimistic predictions, which resulted in hundreds of thousands of people loosing their fortunes; in contrast, the Harvard professors' reputation was incorrigibly damaged.

Galbraith himself suffered from financial Wonderland. He published his book on the 1929 financial crash in 1955. When somewhat later that year the financial market collapsed again, some members of the public accused Galbraith's book of this. Galbraith started to get letters with threats of physical violence and promises of praying for his early death and health deterioration. *About that time Galbraith had a skiing accident and broke his leg; some of the accusers took this event as the proof of effectiveness of their prayers.* The direct "Self over matter" magical phenomenon of Wonderland worked out with the perseverance of a machine.

The laws of Wonderland are particularly influential in the area of advertising. Studies have shown that placement of commercial products within films positively affects the viewers' ability to memorise these products; if a movie character personally uses a product (for example, pours Evian water into a plate in order to give it to a dog), then this increases the viewers' general positive attitude towards that product [13]. But why do people develop a more positive attitude toward the product used by the movie character than to other similar products placed in the context of the same movie? Because the movie star touches the product, and the people want to be as beautiful and famous as the movie star. The magical law contagion is at work here: *An object that was in physical contact with a celebrity magically absorbs the qualities of the celebrity, becomes "contaminated" with these qualities and then passes these qualities to those who possess a similar object.* Subconsciously the viewers hope that if they use the same product (e.g., Evian water), then some of these qualities will pass to them.

The magic of numbers ascends to Pythagoras (570-490 BC) but it also works today. Among magical numbers number three is perhaps the most popular one: Remember

the three piglets of the popular children's tale, the three musketeers, and the three magical cards. A recent study conducted by psychologists of Georgetown and Californian universities has shown that advertising is affected by the magical influence of number three. If you want a product you advertise to be taken favourably by potential consumers you need to name three positive qualities of the product, and it is irrelevant if the advertised product is a flask of shampoo, a hotel or a presidential candidate [14]. But if you try too hard and name four or more positive qualities – the magic disappears and the advertised product loses its charm in the eyes of consumers. Do you want to positively present a man? "Handsome, intelligent and nice" would do the job, but "handsome, intelligent, nice and a good sportsman" would be an overshoot. But why do people trust to only three adjectives? Could it not be because the number 3 comes from Wonderland and is a magical number? Beside its unique mathematical properties, number three is basic in many world religions, such as Christianity, Buddhism, Hinduism, Taoism and Wiccan. In Chinese and Vietnamese mythology number three is a lucky number [15]. *Guided by the magical law of sympathy, people transfer their trust toward number three to the product that has three positive adjectives.*

Commercial advertising that interrupts a program every 15 minutes annoys many people who watch a TV. But if you look into advertisement clips more closely you might notice that some of them involve good knowledge of human psychology. I was always interested in watching advertisements with magical effects. Why do advertising companies need such effects, which are cognitively complex and probably expensive to make? Do they assume that the magic clad products are remembered better and liked more by potential consumers than the products placed in a no magical context? Research reviewed in the previous chapter supported this assumption. It

turned out that the brands placed within the magical context indeed were better recognised by the viewers in the subsequent test than the brands placed within the non-magical context [16]. *By the law of contagion, commercial brands "stick" to the impressive magical effects, and are therefore remembered better than the brands clad in a less impressive mundane visual context*.

The magic of medicine

Modern scientific medicine has been around for approximately 250 years, but how did people live without it in the earlier times? They believed in the healing powers of medicine men, shamans and priests, and this belief was sufficient for the healing effect to take place. This magical effect of a patient's belief on his or her physical state is known as the placebo effect, and this effect is still used in medicine today. To achieve the placebo effect, a doctor gives a patient a capsule filled with distilled or slightly sweetened water and tells that this is the medicine for the patient's illness. It turns out that the patient's belief in that the doctor is telling the truth can be enough to produce some improvement in the patient's condition [17]. Recent studies have shown that even when patients are told that the capsule they are given contains distilled water but taking the capsule could nevertheless help – the healing effect can still follow [18]. In other words, the single belief of the patient in the doctor's healing powers makes the patient's brain elicit substances (hormones and opiates) that can, albeit temporarily, reduce the intensity of pain and other symptoms. Of course, the placebo effect cannot cure serious illnesses, such as cancer and tuberculosis, but the fact remains that our thought alone can influence physiological processes in our bodies.

According to some data, up to 35% of medical doctors today occasionally use the placebo effect in their clinical work [19]. The advocates of magical healing methods

widely employ the placebo effect as well, and it isn't surprising that in some cases magic does really work. However, unlike medical doctors, magical healers are not bound by the Hippocratic Oath "do no harm" and may use the placebo effect in circumstances where this effect is insufficient for cure (e.g., in cases such as cancer, Alzheimer and Parkinson diseases); this provokes unrealistic hopes in the patient and, as a result, the patient may apply for medical treatment when it is too late.

Homeopathy is another baby of sympathetic magic. In accord with the magical law of sympathy, homeopathic medicine relies on the principle that "similar should be treated with similar". The idea is that the "medicine" should contain substance that causes symptoms similar to those caused by the illness, but in a very slight form. This medicine is dissolved in water or spirit, then some water is added and the solution is stirred, then the procedure of adding water and stirring is repeated up to 30 times. Homeopathic doctors believe that the resulting solution works better than those recommended by official medicine. The mechanism of the healing effect is that the water is "charged" by the energy of the original substance, plus the energy of the homeopathic doctors themselves. According to some data, in European countries up to 40% of practicing doctors employ some of homeopathic methods. Clearly, official medicine and chemistry can not account for the mechanisms of "charging" the water by the energy, but even if healing results of homeopathic medicine do not exceed the results of the placebo, homeopathic healing might still have some healing effect. No wonder that in 1999 only in the USA a few million people attended homeopathic doctors [20].

In order to avoid lethal mistakes, in the XX century magical medicine started to present itself not as an alternative to scientific medicine but as a medicine that

complements scientific medicine. Few people would argue against the idea that when a patient has terminal cancer and all of the possible scientific methods have already been used, it is necessary to raise the patient's spirit; then the rituals of "protective magic" might help [21]. This is a no loose game: If the magical rituals don't help, then they don't do any harm either, but what if they do help?

It turned out that magical medicine could even be used to "cure the destiny". Everyone knows that destiny can't be changed. Yet recently Russian TV showed a program about a surgery in Japan in which a person's destiny is corrected by carving new paths on the person's palm. And the number of people who would like to "correct the fate" grows. Obviously, these people believe that lines on a person's palm is the image that reflects the person's fate laid down in Wonderland. Yet, speaking rationally, to believe that by changing the image one can change the original is the same as to believe that one can change a riverbed by altering the river's track shown on a map. But rational logic doesn't work in Wonderland. In Wonderland, causality works both ways: For those who believe that palm lines and fate are magically interconnected this single fact is sufficient for the hope that changing one of the pair may change the other. An interesting question to the believers could be: If an angel (or a demon) who lives in Wonderland changed our fate, would our palm lines change as well?

The magic of politics

Imagine that in the known Biblical story god did not part the waves of the Red Sea in order to let Hebrew people cross the sea and avoid being reached by the pharaoh's army; instead Moses taught the people to build large rafts and the people used the rafts to cross the sea. Imagine also that Jesus did not raise Lazarus from the dead;

instead he cured a badly ill yet still living Lazarus. Would reducing miracles to a lower rank of rare yet possible events affect the image of political and religious leaders and diminish these leaders' unconditional respect and authority among their peoples? It is quite likely that it would.

The question is therefore why gods need to be mighty wizards and not just magnified copies of ordinary people. Who need gods to be wizards – gods or people? It looks like people need this more than gods. First, they need this in order to explain the unexplainable – the origins of the world and the human soul. But most important, people's leaders need this in order to sanction their political and spiritual power. Indeed, in the animal kingdom a leader (e.g., alpha male) enjoys its authority only temporarily and has to permanently fight for it. In contrast, in a human society a leader can enjoy his or her authority for life and pass the title to his or her heirs. But for this to be possible the leaders have to make the people believe that they (the leaders) are under the protection of gods. For instance, early Egyptians believed that the pharaoh is a son of god. The authority of modern spiritual leaders (e.g., the Pope) is sanctioned by god as well. Finally, as will be argue later in this chapter, the advantage of the good over the evil is impossible to maintain without the approval of gods.

The assumption that modern people believe in the supernatural powers of their leaders explains the effectiveness with which the leaders manipulate mass consciousness. The people of Japan believed that their emperor Hirohito (1901-1989), who ruled in the time of the World War II, was the descendant of gods [22]. This popular belief contributed to the fanatical stubbornness of the Japanese army's resistance during the battles with the US army. In the battle of Okinawa (April 1945) Japanese suicidal

pilots (kamikazes) inflicted heavy casualties on the American fleet, and it became clear that breaking Japan's army resistance by regular weapon can only be done at a great cost. The awareness of this was a main factor in the American's decision to use the atomic bomb. A kamikaze ("the divine wind" in Japanese) was a volunteer who sacrificed his life to the divine values and expected rewards in the afterlife [23]. Studies suggest that the belief in divine values is the foundation of modern political terror as well. For example, Palestinian suicidal terrorists didn't differ from their compatriots in any way except their fanatical belief in god [24]. *The belief in the supernatural helps a suicidal terrorist to overcome the fear of death, which in ordinary people serves as a tap that prevents releasing the energy necessary for committing an act of self-destructive terror.*

In Chapter 7 we discussed how the ideologists of free market economy in Russia managed to persuade the workers that privatisation of plants and factories was in their own interests; this was done by sheer manipulation with the workers consciousness and without giving any proof whatsoever [25]. This manipulation was, however, carefully prepared. In the middle of 1980-th Soviet central television gave its main channels to psychic healers – Anatoly Kashpirovsky and Allan Chumak – who practiced séances of magical healing with millions of people watching. When the TV screens suddenly swapped magical heelers for the ideologists of privatisation, the people's consciousness was already "softened" and the psychological ground for the suggestion ready. By using this moment, Yeltsin's economists easily "persuaded" the people that privatisation would magically improve the people's economic conditions.

In a similar vein, many Western nations today easily follow their leaders' appeals to initiate local wars and change regimes in independent countries, even when in private

many people understand the futility of such enterprises and are sorry for the loss of lives of their soldiers and the bloodbaths that usually follow the toppling of unwanted regimes. *This apparently illogical behaviour of educated peoples should not be surprising if we accept that the peoples' subconscious belief in the godlike rightness of their political leaders usually overrides rational considerations.*

The magic of morality

"I want to be a mean boy" – a 5-year-old boy told me, having watched an American cartoon with a teenager named Ben Ten as a main character. "Why" – I asked. "Mean boys are strong" – the boy answered. And I confess, I struggled to find a persuasive response. The boy was still too young to grasp the idea of rewards and punishments that might await a person in the afterlife. How could I prove to a 5-year-old person that the good is better than the evil? Indeed, Ben Ten is not a kind boy, but he is strong, wit, brave and always wins. In his classroom the boy sees the same: Strong, bold and mean boys take an upper hand, whereas kind and gentle boys try to copy them. On TV we often see lions, tigers and crocodiles catching and eating beautiful little babies of wilder beasts and zebras. The number of documentaries about Hitler dwarfs the number of films describing the life of Mother Teresa or Albert Schweitzer. Trying to scare the boy by earthly sanctions that might follow his mean deeds (e.g., punishments that he can get from his parents or teachers) is not the right way either. But what is the right way? Where could I find a proper argument for the advantages of the good over the evil? All I could do was to get help from the boy's magical thinking. My assurance that Santa Claus doesn't bring nice presents to bad boys seemed to have made an impression, but would this effect last long? And what if the boy discovered that Santa Claus does bring presents to bad boys after all?

Indeed, what is the good, what is the evil? If we view other people as beings equal to ourselves, then we must follow the Golden Rule of morality “Treat others as you want to be treated”. But if we view others as beings inferior to us (like we do indeed view some other creatures, e.g., domestic animals), then we may do with the others as we please. Let us call the belief in equality between people “the good”, and the belief in the inequality – “the evil”. The evil justifies all sorts of manipulations with other people: Slavery, captivity, rape, sadism and murder. But what makes some people believe in the good, and the others in the evil? The popular answer is that people believe in the good because if it were otherwise then the humankind would not have survived and the people would have exterminated each other in the constant war of “all against all”. But this is not so. In the animal kingdom there is no the good or the evil, but predatory animals do not exterminate each other to extinction. A lion that fights with another lion would not kill the opponent if the opponent runs or takes the posture of submission. A human person does not have similar instincts, but humans do have the mechanism that stops them from following the evil: The socially developed ban on killing the tribesman.

The real problem is to understand what goes on inside our minds when we are free from surveillance. Suppose we observe an evil action that stays unpunished or is even rewarded. We find ourselves in a situation like that when we watch films or read books such as “The talented mister Ripley”. In the depth of our minds, where no one can see us, we are free to condemn or approve the evil. Films like that stir our feelings as we unwittingly ask ourselves “If I were in the character’s shoes, what would I do?” Indeed, our primordial instinct, which we inherited from our animal ancestors, dictates us to choose a mean but profitable action, because in nature the strongest and the fittest survive, and choosing the profitable action increases our chances of

survival. And now, having watched the film, inside our minds we feel as if two ropes pulling in opposite directions are tearing us: Our innate selfishness pulls us toward the evil, but what pulls us toward the good? There are no innate genetic mechanisms that force a person to do morally good things. There are of course innate empathic feelings, but these feelings are weak and depend on circumstances (e.g., whether we like or dislike the other person). The only force that could make us do morally right things is a supernatural observer who is watching us from Wonderland and demands that we follow the Golden Rule. In modern monotheistic religions, the holder of morality is god. Although consciously we may consider themselves atheists, subconsciously we may still believe in that god exists.

The New Testament says “You have heard that it was said, ‘You shall not commit adultery. But I tell you that anyone who looks at a woman lustfully has already committed adultery with her in his heart’” (Matthew 5:27-28). For believers in god “committing adultery in his heart,” means the choice of the evil, and this choice is punishable. But what about non-believers? It appears that all people who choose the morally good actions have to be believers in god. Of course, they may not realise they are believers, but they are. They are because they behave as if they believed that there is an observer in Wonderland who is watching their actions, like a CCTV camera of some kind. This “practical belief” can be accompanied by the absence of any conscious belief in god. Some psychological experiments suggest that the proportion of such people is about 20% of the population [26]. I think that people choose the evil only if their subconscious belief in god is too weak to overcome their natural egotism. The evil has many faces - from a commonplace disregard of other people's interests to murder - and there are many ways to justify doing evil things. But there is only one way to justify doing good things if doing good things is unprofitable and unobserved

by others -- the belief in the supernatural "enforcer". This role of such belief becomes especially evident in extreme circumstances, in which all hopes to be rewarded for doing well vanish. In such circumstances the “personal myths” that people create about themselves disappear and the people’s souls strip naked. Russian writer and scientist Dmitry Likhachov, who survived the Leningrad blockade by German Army in 1941-1944, writes “Starvation is incompatible with any reality, with anything we know of life where food is available… I believe that the real life is starvation; any other life is a mirage. During starvation people showed who they really were, their souls striped naked, got free of all the trumpery: Some proved to be wonderful, unparalleled heroes, and the others – villains, dirt bags, murderers, cannibals…everything was genuine. The heavens burst open, and God could be seen in the heavens. He was clearly seen by good people. Miracles were happening” [27, p.369].

According to the Old Testament, paradise was Wonderland. God talked to people, lions roamed peacefully next to sheep, and people were immortal and didn’t know the evil. Expelled from paradise, the people were thrown into the world of “laws of nature”: They had to plough, sow, shepherd cattle and “eat bread in the sweat of their brows”. And they met the evil. The evil told a person “You are a master of this world. Other people are nothing but feeble copies of yourself on the screen of your mind. Do always as you please if the circumstances are right”. And only those who retained their memory of Wonderland were able to withstand the evils’ charm. *Without modern people’s explicit or implicit belief in god and the supernatural, universal morality is nothing but an abstract theory or a self-serving illusion at best.*

The magic of the brain

The title of a recent book by a prominent Russian physiologist Natalia Bekhtereva "The magic of the brain and the labyrinths of life" [28] reflects the popular attitude toward the brain as a magical entity, which governs a human person. Of course, calling the brain's work "magical" is only a metaphor; scientists don't allow for any magic to enter the work of the brain. But a person's life is more than the person's profession. Somehow, scientists who study the brain are not indifferent to magic. It appears that something that we usually call natural suddenly becomes supernatural, just as we slightly change our angle of view. For example, a complex biological computer – the brain – all over sudden and due to unknown causes becomes illuminated by the magical light of subjective experience – by consciousness, sensations and desires.

Indeed, why doesn't a person feel pain when he or she is under general anaesthetics? The mechanism that turns a distortion in the body into the feeling of pain is switched off. In other words, the link of the body with Wonderland is temporarily suspended. Indeed, as argued in Chapter 3, subjective experiencing of a simple sensation is unexplainable in terms of physics and physiology. Usually we are unaware of this because the "magic of sensation" is such a commonplace event. Of course, some theorists declare subjective experiences – pain, love, attention, free will and creative insight – to be mere illusions [29][30]. In such theorists' view the brain is nothing but a complex machine. But here some problems arise. First, it is not clear why the brain needs the illusion of subjective experiences in the first place. If sensations such as pain and pleasure are useless, then why are they there? And if they are useful they are not illusions. Second, it is not clear how the authors of the "brain machine" theory can even understand the term "subjective experiences". Because their own brains have to be machines as well, and a machine cannot invent the idea of subjective experiences.

It appears that the authors of the “brain-machine” theory make an exception for brains of their own and view their brains as a holder of something non-mechanical and immaterial, something what we call subjective experience. In reality the authors are looking at their own brains from Wonderland. Viewing our own brain from Wonderland is a very comfortable position, since our brain is in front us in full view as a phenomenon and allows all sorts of studies to be done with it. But then we have to acknowledge that Wonderland is not a fiction, but a fact.

Some scientists go all the way up, from initially denying the reality of Wonderland to acknowledging in the end that Wonderland really exists. For example, neurobiologists Newberg, D’Aquili and Rause started their investigation into mystical experiences by considering the magical world to be an illusion, which is useful for human survival: “God cannot exist as a concept or as a reality any place else but in your mind” – they write [31, p.62]. This point of view suggests that the brain produces the concept of god like the liver produces bile. The authors even found the area in the brain that is responsible for the altered states of consciousness known as “mystical experiences”. However, in the end of their investigation the authors had to acknowledge than the higher reality described by mystics exists independently of the brain and is even more important than physical reality. The evolution of their views brought the authors to the conclusion that the brain does not create mystical reality; rather the brain is like an eye capable of perceiving the mystical reality. In the aforementioned book Natalia Bekhtereva too writes about magical phenomena, such as clairvoyance and prophetic dreams.

So, why do some physiologists and biologists use the term “magic” when they describe the brain’s work? Do they do this in order to metaphorically express the view

that our knowledge of the brain is limited? Or perhaps, *they do this to acknowledge that the brain is not only the "seat of consciousness", but also the organ that links us to magical reality.*

Magic in human relationships

A person who was in love with another person knows the secret unknown to those who never were in love. The secret is that the object of love – willingly or not – acquires power over the person who is in love, because the loved one can decide on his or her whim whether to satisfy or not satisfy the loving person's passionate desire. The loved one becomes a part of the person who is in love, and sometimes this part is a more valuable part than the loving person is for himself. In the person who is in love the instinct of self-preservations is suppressed, and the person can sacrifice for the loved one the most valuable parts of himself – career, honour, property and sometimes life itself.

Literary examples are known. Romeo and Julia committed suicides when they had realized that their loved one was dead. The character of the novel by Stefan Zweig «Amok» gave up his career and life with the aim of saving the reputation of a woman he had suddenly fell in love with. The statistics of suicides based on unshared love is a sad confirmation of the literary examples. Compared to other examples of suicidal behaviour (e.g., psychotic condition of drug abuse) the number of love-based suicides is relatively small, yet notable [32]. Out of 30 causes that lead to suicidal behaviour the first and the second places belong to the death of a loved one and a divorce [33].

But is sexual love towards another person the only form of love? And how about the love to god, to our children, to profession or just to certain things? Indeed, the object of love acquires power over the loving person independently of who or what this

object is, and for the sake of having access to the object of love the person who is in love is ready to give up his or her most vital needs. Suicidal terrorists blow themselves with the words of their love towards god, collectors are ready to pay fortunes for the sake of obtaining the object of their passion, and the person's love to his or her profession can make the person's life impoverished in other respects. The character of another novel by Stefan Zweig «Buchmendel» – an eccentric but brilliant book peddler – was so deeply captured by his love towards his profession that he simply failed to notice that the war had broken out; as a result, he lost his freedom and ultimately his life. Unlike love, other feelings, such as attachment, sympathy, interest and curiosity, attract us to objects but don't ruin the basic hierarchy of our motives and stay under our rational control.

So, what makes a person in love to go great lengths in order to get in close contact with the object, which from the rational point of view, the person might live without? *It can be assumed that the force, which drives the person in love to the object of love, is magical participation.* As mentioned in previous chapters, the person who is engaged in participation unwittingly crosses the borderline that separates mental processes (e.g., the feeling of disgust elicited by watching a piece of chocolate shaped into the form of dog's feces) from real objects (e.g., the piece of chocolate that is entirely suitable for consumption). When falling in love, the person's subconscious choice gets fixed on a certain object with which the person identifies himself or herself in part or completely. The factors that influence this identification are so complex and bizarre that they can hardly be a subject for a systematic analysis. Phenomenological and artistic descriptions are better suited for such analysis. Speaking metaphorically, love is a trunk of a tree whose roots, dividing and branching in most unpredictable ways, go deep into biological and cultural underground of a

human individual. Still, there is something in "being in love" that cannot be reduced to natural causes, and this something is the fact that *the object of love is not a part of the external world, but a part of our own mind.* We are in love not with a real person "out there", but with the image of that person we created in our mind. *Love is therefore a quasimagical phenomenon – an interaction between two processes within our mind: The need to fall in love and the image of the person we chose to fall in love with* (see Table 0.3).

It is not a coincidence that attempts to attract love by magical means have a very long history [34]. Love magic was widely practiced in Ancient Egypt, Greece, Rome, among Gallic and Celtic tribes in Europe and Britain [35]. One of the first motives on this theme was the myth of Hercules' wife Deianire, who tried to attract her frivolous husband to herself by smearing his cloak with magical potion given to her by the treacherous centaur Nessus, unwittingly bringing Hercules to his death. In Europe of the Renaissance (14-17 centuries AD) love magic often was interweaved with Christian ritual routine: People used to hide clay dolls or rolls with love spells in churches, and churches' candles were lit during magical love rites [36]. Interestingly, in the time of Renaissance love magic was predominantly associated with women and included such aspects of female sexuality as fertility, menstruation, and genitals, whereas men were viewed as unrelated to love magic. This one-sided attribution of love magic to women was evident in trials of the Holy Inquisition: Most of these trials were over women accused of bewitching men. Thus, the medieval text Malleus Maleficarum (the Hammer of Witches), written in 1487 by the German catholic priest Heinrich Kramer, attributes women's inclination toward love magic to their insatiable love passion instilled by the devil [37]. The association of love magic with women could, however, be a bias caused by the fact that the majority of the authors writing on

love magic were males. There are also data testifying that men applied love magic as frequently as women, for instance, in order to attract love of a desirable but unreachable woman [38]. Today, like in the ancient times, love magic occupies a noticeable position in life. A search in Google on “witchcraft and love” brings over 27 millions of references, and on “love magic” – over 1 million and 200 thousands. Egyptian love spells are widely used [39], followed by Wiccan love attracting spells [40] and others.

In the English speaking world today it is common to use the term «chemistry» when talking about love, meaning that a person in love gets united with the object of love like one chemical element with the other, thus creating a novel entity. This deceptively simple metaphor is quite exact, as it captures the quasimagical nature of love, based on the rationally unexplainable phenomenon of the change of quality. Indeed, it is impossible to explain in rational terms of why the unification of two elements, hydrogen and oxygen, which under normal conditions are gases, results in an entirely new substance – water, which possesses properties different from those in the gases. Chemistry and physics can explain the mechanism of the unification, but not why the unification leads to the emergence of new qualities. The new qualities in complex chemical substances cannot be reduced to or deduced from the qualities of the simpler substances. The emergence of new qualities is a phenomenon similar to the phenomenon of magical emergence/vanishing (see Table 4.1).

Still, in cognitive science today attempts were made to link the phenomenon of love to biochemical processes in the brain. For instance, the specialist on neuroethics Brian Earp suggested that love is a phenomenon rooted in ancient neurochemical systems that evolved for supporting reproductive activities of organisms in our ancestors [41]. According to this scientist, in some respects neurochemical basis of love is similar to

neurochemical mechanisms of drug addiction. Like drug addiction, love can usurp the person's will and deprive the person from the ability to make rational decisions. This opens the possibility to «cure» a person from love by means of giving special «love-reducing» pharmacological substances. In his interview Brian Earp acknowledged that our experience of being in love couldn't be reduced to brain chemistry, though he did not clarify what exactly distinguishes love experience from its neurochemical basis. Yet this distinction is clear enough: It is impossible to logically deduce the experience of being in love from brain processes in the same way it is impossible to deduce physical and chemical properties of water from the properties of hydrogen and oxygen. *The experience of being in love is a novel quality, which obeys not the laws of brain chemistry but the law of magical thinking – participation*.

So, is it really possible to cure a person from the magic of love? Research has shown that an increase in blood-level of serotonin - a mood-regulating hormone – can reduce sufferings of patients with obsessive-compulsive syndrome. A similar increase of serotonin blood-level was observed in people when their love passion was fading. This correlation allowed some scientists to suggest that increasing serotonin blood-level might reduce the person's love passion [42]. Drugs like that are called antidepressants. But using antidepressants for curing the experience of love is the same as trying to fix a wristwatch with a hammer. Antidepressants reduce a general level of human ability to experience romantic attachment toward people. The fact of converting a person in love into an emotionally insensitive individual says nothing about the unique passion which love is. What this fact confirms is that the intrusion into brain processes can influence subjective experiences, but the laws these experiences obey remain independent of the brain processes. Clearly, if a piano isn't

properly tuned, then the harmony of a musical composition this piano is playing could suffer, but the magical harmony of the musical composition in its own right is independent of the condition of the piano's bars and strings.

Getting into Wonderland

Historically, people used various ways of accessing Wonderland. In the ancient times and in the Middle Ages religion, witchcraft, astrology, and alchemy provided such access. In the time of Renaissance art - paintings, poetry and literature - joined the club. In the XIX century there appeared spiritualist movement, in the XX century – parapsychology. Cinema and TV opened new opportunities for visual representation of Wonderland, in the form of such masterpieces as films by Walt Disney and Alfred Hitchcock or, more recently, the “Lord of the Rings”, “Narnia” and “Harry Potter” series. Finally, in the end of the XX and the beginning of the XXI centuries there appeared interactive forms of visual representation of Wonderland - computer games and the Internet. Electronic gadgets (notebooks, androids and iPhones) brought Wonderland into a family and a children’s room. Excursions into Wonderland became routine and easily affordable.

Simultaneously with the growing accessibility of Wonderland another process was going on: The fading of traditional religious feelings in modern urban population. In the previous centuries the belief in god connected people with the supernatural. In the modern industrial world people began to increasingly pay attention to the material side of life. Technology, medicine and education made the life of a modern western individual safer and more comfortable, but they didn’t make the individual free of worries, frustrations, illnesses and death. Technical progress cannot teach us what to

do in situations of moral choices, or answer the question of what meaning our lives have beyond simple perpetuation of existence. But most important, science and technology did not change the essence of a human being – the need for a person to feel that he or she came to this world for something more valuable than mere survival. Existential vacuum developed in the heart of a modern person. When a person is healthy, not hungry and has a shelter, the person begins to feel bored. And there appears the urge to peep into Wonderland. Some people still seek Wonderland in the church, but the number of such people is plummeting. And what do those people have to do who lost their belief in god, or never acquired this belief in the first place?

The simplest way to get in touch with Wonderland is using hallucinogenic substances, like alcohol or cocaine, but this is a damaging and dangerous way. It is much better to go to a nice concert, read a good book or let oneself be carried away by a daydream, but for this one needs education and powerful imagination - the skills of understanding music, pondering over a book and the ability to dream. A more accessible way is to “buy a dream”, by plunging into the virtual reality of a cinema or a computer game. By identifying themselves with movie characters, people can experience the illusion of their own value and power. By plunging into Wonderland, we temporarily get out of monotonous predictability of everyday life. In this way *magical thinking fills the existential vacuum that torments many people today*. Entertainment and computer industries exploit the need of modern people in accessible ways of getting in touch with magical reality, by stuffing the market with movies and electronic games. There exists also a more positive trend in exploiting people’s magical thinking -- using magical thinking for psychotherapy and the development of imagination [43]. Yet, as recent studies in psychology have shown,

the penetration of Wonderland in the life of modern people goes beyond magical thinking alone.

Rapa Nui: Conclusion

This chapter began with the questions: Why do rational people like to play with magical reality? What psychological consequences can this fascination with magical reality bring about?

Experiments have revealed that in modern educated adults the belief in the supernatural did not cease to exist. Under the pressure of science, this belief descended into the subconscious, but keeps filtering into various domains of modern life: Economics, medicine, morality, art, politics, education, and theories of modern physics and astronomy. This hidden belief in the supernatural can explain phenomena of modern life, which without such belief would be hard to explain. Why do rational people, when they are faced with choices in economics, often follow the laws of magic rather than common logic? What makes modern educated individuals follow political ideas that contradict the individuals' conscious interests? Why does the placebo effect exist? Where from do suicidal terrorists take their courage to commit actions of self-destruction? How is it possible that some people make moral choices and sacrifice their private interests even when there is no surveillance? Why do some scientists call the work of the brain magical? Why is being in love called chemistry? How is it possible that the whole universe once had the volume smaller than a grain of sand?

Excursions into Wonderland are not for entertainment only; we need them to fill the existential gap in our souls. Our tendency to engage with the supernatural, sometimes at a great cost, reminded me of Rapa Nui people who live on Easter Island lost in the

vastness of the Pacific. The history of this people is sometimes quoted as an example of a wasteful attitude of the inhabitants to their natural resources. For the sake of transportation and erection of giant stone statues called Moai the inhabitants completely destroyed the island's luxurious palm grows; without the building material for rafts and canoes the islanders were unable to fish and their culture fell into decay.

This may be true, but what would this small piece of land be without its Moai statues? It would remain an insignificant little island, one of thousands scattered around the ocean. Rapa Nui people would be nothing to say about except that this people is an ethnic group that speak Polynesian language. The whole greatness of Rapa Nui people is in the fact that these people did not simply believe in their gods, but made a creative effort by building the giant statues that impersonated the gods. For physical survival of the people this creative effort was meaningless and self destructive, but its cultural significance was immense. The creators of Moai can only be compared with the anonymous artists of the Upper Palaeolithic who covered their caves with magnificent paintings of animals and people, and with the builders of Gothic cathedrals.

Perhaps, all that we call the great achievements of culture is exactly that -- a self-destructive super-effort, which people make against the voice of reason and the instinct of self-preservation, for the unstoppable urge to get in touch with Wonderland. Rapa Nui people were unfortunate, since they lacked external sources of restoring the damage caused to their environment by their artistic effort. Modern descendants of this people live a very ordinary life and don't resemble their famous ancestors in any way; instead, nations of the West stepped on the Rapa Nui ancestors' way. Today billions of dollars are spent on construction of machines, which accelerate elementary particles of matter to the speed of light, but don't have any utilitarian

value. The same can be said about giant telescopes that can see the remote edges of the visible universe. A final product of these supercolliders and mega-telescopes is the real Wonderland – the concepts and theories that disturb the otherwise consistent and unified temple of modern science. These concepts and theories include the Big Bang, quantum nonlocality, parallel universes and other miracles of modern theoretical physics.

Magic is incomprehensible, potentially dangerous, rejected by science and religion, yet it remains irresistibly attractive to people. Experiments have shown that if a person is given a choice of seeing either “real magic” or a new and exciting scientific effect, most people (children and adults alike) choose “real magic” [44]. For children this choice is understandable, but why do most adults go for it? Could it not be because, on the bottom of the heart, every person still harbours the belief in that the world of the supernatural is not a dream but reality? Against all odds – theories of science, efforts of school education and testimony of everyday experience – modern people still believe in miracles. Because if Wonderland is real – this might be something. Perhaps, this can even make us immortal.

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Epilogue: Imagining the Unimaginable

Abstract

A thought experiment is described, in which the world free of magical reality is designed. Imagining a world without magic is a contradiction in terms, since the very process of the imagination is a magical phenomenon. Yet, like in some drawings of Moris Escher, in which water in the canal seems to be flawing upwards, the illusory image of this impossible world can be generated. This thought experiment brings one to the conclusion that in this conjured world many social sours of the real world, such as religious wars, witchcraft, drug-cartels and suicidal terrorism, would disappear. But this would be a very dull and uninspiring world, in which few people would like to spend their lives.

Science liberates, but it also hypnotizes: It makes us insensitive to the reality of the supernatural. In order to free ourselves from this hypnotic dream, let's make a thought experiment. In this experiment we imagine that magic and magical thinking disappeared from the world. What kind of world would that be?

Of course, imagining the world like that is a contradiction in terms, because the

imagination itself is a part of subjective experience, and subjective experience by definition is a magical phenomenon. We know that galaxies, stars, planets and the whole universe exist in their present shape because we know about them: We see them through telescopes, develop theories about them, model them in our computers, write books and papers about them, and all of this is subjective experience. With subjective experience gone, the physical universe would of course remain, but we wouldn't be able to say what this «unconscious» universe is like. So, it looks like we are trying to imagine the unimaginable.

But there is a way out of this paradox. We can try and imagine the magic free universe «as if» we were still seeing this universe by some kind of the bodiless «god's eye». After all, we do imagine the universe as it existed for billions of years before life appeared on Earth. Of course, we know that this early universe is still a product of our subjective activities: We reconstruct the «universe back then» on the ground of the universe we see now, but this reconstructed universe is still a useful model that helps us understand the world. Like the «impossible waterfalls» on the pictures of Morris Escher, where water is flowing upwards, the image of the «unconscious universe» is an illusion, yet it appears real. So, let's pretend that we see the world in which there is no the supernatural, but there are still intelligent beings.

What kind of beings would they be? Certainly, they won't be living creatures, because life too is a supernatural phenomenon. Rather these creatures would be similar to intelligent machines. A creature like that would have intelligence, but their intelligence would be different from what we call human thinking. Rather, a more suitable term for this intelligence would be «information processing». The difference

between human thinking and information processing is that thinking is a form of subjective experience – a part of the human soul, and information processing doesn't need a soul. A soul, or subjective experience, is the magical entity that the creatures of our utopian world would lack. So, let us call these creatures «nosouls». Let us imagine what nosouls could and couldn’t do.

To begin with, nosouls won't be able to see dreams or experience feelings through immersing themselves in the magical world of art or taking hallucinogenic drugs. For these intelligent creatures, love would loose its «chemistry» - the irrational element that is based on magical participation – and their relationships would be reduced to marital contracts and prenup agreements. There will be no moral rules sanctioned by gods, only social contracts sanctioned by positive or negative reinforcements (e.g., switching the electricity supply off for disobedience). There would be neither fantastic worlds of the imagination, nor parallel invisible worlds in which gods and spirits of dead ancestors live. The language of nosouls would be similar to digital languages of computer programming, incapable of carrying metaphorical meanings and animistic expressions, such as «a rising sun» or «the flying arrow».

And what about art? If we to believe that human art emerged as a way of communicating with the ancestors' spirits, nosouls wouldn't have this kind of art. Their art might emerge as the art of design; this art would be strictly rational, like computer graphics or sculptures created by machines. The whole trends in art would disappear. Suprematist paintings by Kazimir Malevich and abstract geometric fantasies by Wassily Kandinsky -- yes, but surrealism by Giorgio de Chirico and Rene Magritte – no. Nosouls would be able to create realistic stories in the spirit of some

Charles Dickens' novels, but magical realism by Alejo Carpentier and Jorge Luis Borges would be unknown to them. The repetitive rhythmic music, however complex, would stay, but the magically inspired unpredictable melodies by Mozart or Tchaikovsky would be impossible.

Religion? There would be none. Nosouls wouldn't fear death, and the thought of the afterlife could never enter their digital brains. Without myth and religion, there would be no archetypical stories able to inspire poetry and art. Luckily for the nosouls, religious wars and suicidal terror would also have no ground. It is hard to imagine nosouls searching for their meaning of life. Perhaps, like in most animals, in nosouls having the meaning of life simply won't be necessary. Only the endless perpetuation of themselves, both in time and space.

Nosouls could probably develop science, but they would not be able to experience the leaps of creative imagination. The soulless “Einstein” would never fly at the edge of a light beam, and the soulless “Maxwell” could never imagine a demon sorting the molecules into the slow and fast ones. Human scientists receive inspiration from the subconscious creative combinations of ideas produced by magical participation, but nosouls wouldn't have the subconscious; instead, they would have to logically induce new combinations from the already available ones, and this would make their science progress very slow.

For psychology the loss of magical thinking would be devastating. With no subjective experience psychology would lose its subject and turn into the science of catching and fixing computer bugs. Some of modern physicists and psychologists would be happy

to learn that in the nosouls world parapsychology would be impossible. Being a machine or a puppet in the simulated cosmic computer, nosouls would be completely merged with the stuff of the surrounding universe, and the issue of affecting this stuff with the efforts of their digital mind could never arise. But nosouls' physical science would also suffer. Without subjective experience, there would be no a fundamental opposition between an observer and the observed; instead, reality would simply be leaving its imprints in the nosould minds, like we leave the imprints of our feet in the wet sand. It would never therefore occur to nosouls to conduct the double-slit experiment and discover the effect of the observer on the observed.

On the positive side, in the utopian world of nosouls some losses would be compensated by gains. Nosouls would be free from the temptation of getting immersed in the magical world of drug-induced hallucinations, and psychotic disorders such as schizophrenia or OCD would be unheard of. There would be no Holy Inquisition, witch-hunting and religious wars. Manipulation with mass consciousness on the basis of the belief in the supernatural would be impossible, and the authorities would have to control their subjects by sheer force. Mass media would be free from charlatans and «specialists» with paranormal abilities. Perhaps, nosouls would be immortal and able to live in space. Feeding on cosmic radiation, they could probably leave Earth and travel in the universe between stars and galaxies.

Would they have any childhood? If they would, the childhood must be a dull one. Without magical Wonderland, without wizards and fairies, the world of nosouls' children would have to be reduced to accumulation of information and learning artificial languages. At that, nosouls' kids would probably be outstanding chess

players from the age of nursery and great at math at secondary school.

With all the losses and gains, the utopian world without magic would have little in common with the world we live in. Because the world of nosouls is impossible, we don't have to be worried with the problems of this fantastical world. Yet imagining the unimaginable helps us appreciate the role of magic in the modern life. The most important role of magical thinking is that magical thinking is the ground on which the whole edifice of our mind is built. Our emotional reactions and communicative interactions are based on sympathetic magic. Psychological effects such as emotional contamination, hypnotic suggestion, or placebo are just a few examples of magic based communicative interactions. In love, in child caring we often apply magical rituals, such as hugging, giving presents or making compliments, which from the rational point of view don't make much sense. But these rituals is a vital part of what poets call «the magic of love», and lovers call «the chemistry». Whereas rational and scientific thinking help us cope with the problems of the physical world, magical thinking and the belief in magic and in god come to our aid when we are struggling with the problems in our social and emotional life. That is why magical thinking and the belief in magic (including the traditional religious beliefs) do not contradict logic and science, but complement them, giving our lives excitement and meaning.

Today, popular topics for discussions are the relationships between people and machines. According to some prophets, in the future a human being will become a cyborg – the merger between a person and a computer. Other theorists predict that AI will progress to the extent when machines become smarter than people and even might take over the humanity. I don't believe in such prognoses. The reason of my

disbelief in this dystopian future is that the world we live in is based on magic. It is the magic of human subjective experience that gave birth to rational and scientific thinking, including the AI. Rather, I believe that in the future the opposite process will be taking place: People will increasingly rely on the hidden powers of the mind. When rational and scientific thinking will reach the limit of their explanatory capacity, the people will have no choice as to return, at a new level, to the ancient belief that the human mind and the universe are inherently linked one with the other. The signs of this return are visible even now. In physical science, these signs are the theories like the «Copenhagen interpretation» and the «many world interpretation» of quantum events, in cosmology – the «anthropic principle», in psychology – the studies on psychic phenomena, such as ESP or psychokinesis. And although predicting the future is a risky business, I believe that the future world will be a lot less «inanimate» than the world of today. That is why magical thinking is, and will increasingly be, an exciting topic for interdisciplinary research.

Words: 1848

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