
PSYCHO-LOGIC WITHIN TECHNO-LOGICAL SETTINGS

Bogdan Popoveniuc*

'Stefan cel Mare' University, Strada Universitatii nr. 13, 720229 Suceava, Romania

(Received 13 August 2012, revised 8 November 2012)

Abstract

Our life style changes too fast from one generation to another, forced by the rapid technological development. The human bio-socio-cognitive tri-unity has become technologized on all its three levels: prosthesis and extensions for our biophysical functions, virtual networks and digital communities for social life, ready-made methods and information for thinking and decision making. The rhythm of technological cultural development is too fast, and human beings and society have no time to find a balanced way to adapt and adopt it. Religion, Ethics and even (Human) Science have been left behind this unprecedented explosion of technology. As a consequence, the evolution of psychological science is wrongly oriented and its evolutionary path seems unable to provide a profound understanding of the human soul.

Keywords: epiphylogenesis, technological evolution, Google generation, epistemology of psychology, beliefs

1. Understanding technology: a prerequisite critics of epistemology

We live in the most scientific world ever, and we believe in Science as much as we used to believe in the gods in the past. The signs of Science benevolence are all around us: it helps us to eat genetically modified food, to breathe air conditioned, to communicate scientifically, to find our compatible peer mathematically, to think accurately etc. The mathematical deductive model of experimental falsificationism and statistical description of causal, correlational or deductive (sic!) deductions is seen as the crown of correct reasoning. A sentence is as scientific as it can be expressed in a mathematical manner. The binary of Eleatic ontology of Existence and Non-existence was technologically incarnated in silicon chip-based digital computers, and this framework of understanding became the master model of knowledge. As a consequence, in a paradoxical manner, the human came to be thought of in terms of digital functioning of a machine, i.e. in *the image of the machine*. Thus, all research programming have begun to study human brain accordingly and the positive results were reported as a confirmation of this paradigm, while the

* E-mail: bpopoveniuc@atlas.usv.ro

uncertain and doubtful ones are arrogate to the imperfections of experimental settings or some specific part of methodology.

There is definitely nothing wrong with this evolution of knowledge in itself. Cultural development and the evolution of human consciousness look like a completely natural process. What looks peculiar is this invariability of current paradigm of understanding that monopolizes the entire truth. We could easily concede and understand that in the dawn of human understanding development, the scarceness of human knowledge entails such self-defending mechanism of banishing the concurrent views over reality. Although, we can think that quite the sparseness of these means of expression and explanation should open the tolerant or, at least, the inquisitive attitude over alternative ways of understanding. What is weird is that even a paradigm as critical as the empirical falsificationism of modern science is so intolerant in respect its basilar supposition: what can be known is to be known in predefined terms or not. But modern science arouse from this need of a systematic denunciation of preconceptions or current theories in the light of rigorous empirical test results of their logical consequences. But a conclusive refutation of a theory is impossible because realistic test situations depend on many other conjectural facts than just that theory [1]. Moreover, the verificational assembly (theoretical and practical altogether) has many particular details that can explain and settle down the failure or the refutation of any complex theory [2] and this situation is more obvious within Social and Human sciences. Hence the fundamental program of scientific evolution neither necessarily refutes established theory by anomalies, nor stops the progress of new theories in the light of their empirical failures.

So, as Th. Kuhn [3] and L. Laudan [4], approaches reveal, the natural process of scientific knowledge growth, although underlain by a strong scientific realism, is at the same time doubled by a critical relativism [5] which permits multiple scientific objectives and alternative methods of attaining its alethic objectives. As quantum physics quandary has already shown, even physical world ceased to exist independently of its act of perception. The scientific knowledge is *fallible* (the world will never succeed to be known with certainty approximately true) and it has to be always *critically* evaluated and tested to see to what extent it represents or correspond to that world [6].

This complex and intricate epistemology is more obvious in the case of social and psychological worlds where it is very hard to control the phenomenon of the self confirming theory. (Phenomenon that could be found in physical world research also as the wave-particle duality of light proves!). Even if the experimental settings could be imagined to avoid this occurrence, the complete control of these effects over the set of concepts and images used to represent is an almost impossible task. The Science's vocabulary is built on top of mental images and representation of its epoch. This fact could be easily noticed in the case of brain functioning.

The problem is that the logic information processing in the brain is definitely different than what we know today as mathematical, algorithmic or mechanical information processing. The first one, is often analogous considered a natural processor, the latter, an artificial one. But abstract and rational mechanism of information processing is a late acquisition in the development of human species, and, moreover, it is happening on the surface of the complex bio-chemical mechanisms of brain reasoning machine. In other words, the rationality is a sort of acquired device for adaptation, a non-biological and nonsocial *Organon* for surviving.

The identification of analogue processing information with basic mechanism of brain processing information is a useful simplification for understanding, as long as it is conceived like one, but a deceptive path for further researches. For this reason, until now, the researches proved that the convictions, beliefs, hopes, the volitive mechanisms and affective aspects of natural reasoning remain unclear and we are still far from having an integrated image of brain (and mind) functioning.

2. Living with technology: effects of technological development

The investigation of human brain functioning, the construction of a more appropriate conceptual framework for modelling an even more accurate image of this process is paradoxically hampered by the tool which supports the never seen before progresses made in human mind research: *the computer*. The assisting power of computing devices is thousands of times multiplied by synchronic networks in which they are included. It helps us not only to count, to write, to read, to acquire information, to make decisions, but also to socialize, to entertain and consequently it assists us to love, to hate, to express our feelings and ideas, to think, in a word, to live. The human of the industrial age is so dependent on the technical systems and hence much of his work and actions rather serve it than make it serve him. Humans have almost become the servants of Technics, the ultimate tool for making tools.

The Technology, the Tool, the tool for making tools, intelligence, mediates everything. The tools succeeded to create their own environment:

- Our physical relation with the natural environment is mediated by technology. We live in a temperature and humidity regulated environment, covered spaces, with artificial light, eat technological modified food, etc;
- Our social relations are mediated by technological means of communication and this mediated environment of communication increase and enhance our possibilities of communication, e.g. simultaneous translations, written, audible, and video telecommunications, ready-made clips, greetings, romantic declarations to express our emotions, feelings, and states;
- Our rationality, thought and *Weltanschauung* is moulded by scientific technology of positivist thinking, to objectify, standardize, measure the surrounding reality.

The artificial environment built and continuously heightened by humans, has already covered all three aspects of human tri-unity and imposes new regularities, driving forces and laws of behaviour in its physical realm (artificial controlled environmental characteristics), its social environment (juridical and political driven intercourse) and its cultural medium (symbolic and virtual-computational constructed reality). But, the impact of artificial environment, I am thinking here of the 'material' dimension of technological artefacts, would be of secondary importance for the evolution and life of human being if it would not insert itself within our minds and souls and become part of our affective, intellectual and volitive existence. The psychological consequences of living in (pre)fabricated environment, of using prosthesis which continuously extend our bodies functions, inevitable and ceaseless mediated communication and social interaction, the avalanche of news, data, information, knowledge force our brain and psychic to change too rapidly its thousands of years of mechanisms of processing information.

These major and fast changes in human environment force the human brain to an unprecedented major adaptation and are also a source of a massive amount of stress which modern man has to manage. And this unprecedented mutation in human species requires a well-documented and serious attention, in order to be understood and managed. At this level and state of evolution the human hubris is the most dangerous threat for the human spirit, especially when it is built on delusive mega-power of technological tools and not on individual's aptitudes, skills, and abilities.

There are many changes induced by hasten technological development. The long term effects of life in such artificial environment and using such tools and means for communication had no time to become very noticeable and to be studied as such in their deep aspects, albeit, a lot of these was already signalized and questioned. Among the most notably vectors which affect the human evolution were the effects of mass-media on human psychology, social skills and culture.

Even if different from face-to-face interaction, media is not only a passive channel of information, it also supplies the stuff for thought and shapes the process of thought [7]. This idea is easier to understand if we take into account the relation between human species and technology throughout the entire history of human race. Human species phylogenesis was intermingled from the beginning with the evolution of tools and the technologies of use to the extent that technology was the primary element in differentiating the human from other living beings. Evolution of knapped stones and corticalization, i.e. the migration of function from subcortical centres to the cortex, was dialectical. The incredible neuroplasticity of the human brain explain, at a biological level, the influence of technology over the development of civilization and the history of human consciousness [8]. For more than three thousand years fragmentary and mechanical technologies extended human species bodies in space all over the world. The last century of electric technology extended the human central nervous system itself at a global level, abolishing both space and time. Right

now we are undertaking the last extension of man through the technological global brain, or simulated consciousness of the World Wide Web. The global consciousness, i.e. collective process of knowing, will represent the final incorporation of the human being extension, in the same manner as its senses and nerves were already extended by the various media and technologies.

But the psychological (social and cultural) consequences of the technological designs or patterns as they amplify or accelerate biological processes have long term unforeseeable consequences. Any extension, whether of skin, hand, eye or cognitive function, affects the whole psychic and social complex. Any technological innovation generates many changes at the level of scale or pattern of action and thinking into human affairs. The cars and public transportations accelerated and enlarged the scale of motor functions and drove to the modern metropolis, new kinds of work and habits. The discovery of electric technology changed completely the human society and culture. "Men are suddenly nomadic gatherers of knowledge, nomadic as never before, informed as never before, free from fragmentary specialism as never before – but also involved in the total social process as never before; since with electricity we extend our central nervous system globally, instantly interrelating every human experience." [7, p. 358]

The problem with the quoted author is that he is so excited by the unimaginable possibilities opened by development of electrical technologies, that he forgets they are only possible effects or path for future development. They are not sole, certain or necessary results. The individuals could, and they really are, affected and could use in various way the opportunities of new technologies. Effects of technology on psychic formation and manifestation could be less harmless and get to involution.

3. The psychology of technology

This is the case of Internet overuse, which is prone to chip away capacity for concentration and in depth reading. The intermingled volume of information from the Internet is not just an inert archive of knowledge at hand, but a very active medium which also shapes the process of thought. The unbelievable possibilities opened by computing technology of information seem to have unexpected consequences. The unlimited informational opportunities entail a loss of depth in our thinking, brought by the same adaptive mechanism of evolution. Human intelligence adapts itself to the new informational medium and shifts its functioning away from what might be called meditative or contemplative thinking and move toward what might be called a utilitarian intelligence. "My mind now expects to take in information the way the Net distributes it: in a swiftly moving stream of particles. Once I was a scuba diver in the sea of words. Now I zip along the surface like a guy on a Jet Ski." [9, 10]. Researches already reveal important differences amongst scholarly communities as a result of utilization of existing massive digital choice, unbelievable (24/7), access to scholarly material, disintermediation, and hugely powerful and

influential search engines. “Everyone exhibits a bouncing / flicking behaviour, which sees them searching horizontally rather than vertically. Power browsing and viewing is the norm for all.” [11] The unprecedented amount of information put human intellect on a trial. In order to cope with the pressure imposed by intelligent technological design we should to up-date and even change our natural nurtured intelligence. “So, in the search to understand and create Intelligence, we have in fact reinvented it, through the bridge of non linear complexity and, I dare to say, of the non-generic universality.” [V. Guliciuc, *It's Time to Re-invent Wisdom* (manuscript)] The effects of this transformation are in progress and we can't know for sure if they would be in the final advantageous for our welfare. For example, the technological extension of our bodies is designed to alleviate physical stress, but it can bring on psychic stress generated by induced dependence and helplessness, which may be much worse.

Such view, as that of Marshall McLuhan, is too optimistic, or better said, it is a literate overwhelmed by the importance of writing which misses the continuity of essence between the mechanical technology of writing and the electrical technology of the Internet. He almost celebrates the new shift brought by the electrical Age and neglects the unpredictable consequences of any complex invention. Technological evolution, in general beneficial for the humans, could turn to be only an uncontrolled blind evolution not so advantageous for the human species after all. “The closure of the cortical system evolution of the human imply from the vantage of a general history of life (...) *the pursuit of the evolution of the living by other means than life* – which is what the history of technics consist in, from the first flaked pebbles to today, a history that is also the history of humanity” [8, p. 135], i.e. the epiphylogenesis of man through technology. Technological epiphylogenesis recapitulates, dynamic and morphogenetic (phylogenetic) accumulation of individual experience, through the mediated medium of tool. Not only the human brain, but any organism is, from an evolutionist perspective, an integrated collection of problem solving devices, i.e. adaptations. These devices were shaped by natural selection over evolutionary time to promote, in some specific way, the survival of the genes that directed their construction [12]. If these devices would be better designed by intelligent devices, the human outdated mechanisms of perpetuation could become a useless artefact which will no longer be needed. (See Chalmers' célèbre syllogism [13]).

Consequently, it becomes clear how the biological individual, which is organically organized matter that has complex relations with its manifold environment (both inorganic, natural and artificial, material and cultural, and organic natural and social as well) establishes a dialectical rapport of reciprocal inventing of tools by the humans, and the humans by its tools. This state of affairs is augmented along with the evolution of more complex technology up to the point of self-creation and self-dependence. “Perhaps the most obvious ‘closure’ or psychic consequence of any new technology is just the demand for it. Nobody wants a motorcar till there are motorcars, and nobody is interested in TV until there are TV programs. This power of technology to create its own

world of demand is not independent of technology being first an extension of our own bodies and senses. When we are deprived of our sense of sight, the other senses take up the role of sight in some degree.” [7, p. 68]

The way in which the development of new material (the wheel, steam engine, electricity) or cultural technology (writing, printing, media) affects the development of human psychic, where not so obvious from the beginning, and some time they remain unnoticed a long time after their full effects have become noticeable. Literacy, for example, extended the visual power to the uniform organization of time and space, psychically and socially altogether. This fact nurtured an attitude of detachment and non-involvement with very dangerous long term consequences for human society. As some systematic studies already revealed, the way in which new communication technologies are actually employed by users and the behavioural outcome is other than it would be expected. For example, the intense website users are, contrary to what is expected, slightly more knowledgeable about topics of interest; their knowledge is limited to the particular field or topic but does not extend to the entire domain. They know a lot of diverse things about motor characteristics of the fancy new cars but nothing about mechanics; they are knowledgeable about specifications of computers, different characteristics of TV sets, but they have no clue about electronics; they know much about individual parliament or presidential candidates, but are profane about the political world in general. What is more worrying is the way in which the epistemological treasure access is employed by users, not to verify, correct, and increase their knowledge, but for to confirm their existing preconceptions, beliefs and opinions. “Social network Web site news consumers follow news about public affairs, but to a limited extent relative to other types of news, and are not particularly interested in pursuing diverse sources of news and/or ideas”, but rather “users of these sites tend to seek out views that correspond with their own.” [14]

The detachment about personal responsibility and engagement, brought about television and print media, is continuing within the Internet Communications Era. “Although social network news users were more likely to engage in Internet-based political activity (blogging, forwarding a political e-mail), they were not more likely to participate in more conventional activities such as voting.” [14]

The effects of technological life could be noticed at every level of psychic system: cognitive, emotional and volitive [15]. Let’s see some possible, many of them already noticed, psychological consequences of Technology. In the first case, “the good news is that technology can make us smart, in fact, it already has. (...) The bad news is that technology can make us stupid.” [16] The change of tension, overweight of some brain function and poor utilization of others, the required quick and constant re-adaptation generates neurosis and anxieties at individual level which have to be overcome. The mediated action, the life with a buffer interface with the real word constructs, could entail some social adaptation problems. Human masters the technological magic of materializing, translating and ingraining the results of its actions, in multipliable material forms

and this fact create a sort of feeling of immortality. Consequently, people tend to act as if immortality were inherent in the magic repeatability and extensions of things and as this repeatability assure or could be transferred on his person.

At the same time, the people of the technological world are much simpler than those that developed in the complex natural web pre-technological oral societies. Although they are more individualized, because of fragmentation brought by specialization and mediated communication, at the same time they are emotionally homogenous because of their artificial world of conventional conduct, signs, and meanings. Another very dangerous effect of media long term and intense exposure is the feeling of detachment and non-involvement. On a side, this seems a good thing for the requirement of professional life, because it assures the power to act without reacting. On the other side, it entails a deepening of already existing schizoidy of emotional and cognitive.

Science, scientific perspective is the ultimate outcome of technological transformation of the human species. The programmatic ideal of objectivity represents, at a psychological level, no other thing than the detached disinterested view, the completely ‘dissociation of sensibility’ with warts and all.

This separation of imaginative, emotional, and sensorial life of the literate man was proclaimed long ago by Rousseau and later by the Romantic poets and philosophers. The technological driven life implies an essential process necessary for the development of complex modern society: it undergoes a profound dissociation from and within inner life and this further makes possible dissociation from other, e.g. parents, family, and group of appurtenance, for shaping an individual carrier, or better, *a career as individual*. The individual consciousness could emerge only within the complexity of technological Big City [17]. But the same neuroplasticity “renders our brains not only more resourceful, but also more vulnerable to outside influences” [18]. The effect of writing, typography and mass media affects the human sensibility. It homogenizes whilst apparently individualizes, and secludes its cognitive and rational part by its affective and emotional part. It anesthetizes its aesthetic element. The helplessness brought by any technological prosthesis is the same no matter what kind of “extensions of man, whether it be clothing or the computer. An extension appears to be an amplification of an organ, a sense or a function, that inspires the central nervous system to a self-protective gesture of numbing of the extended area, at least so far as direct inspection and awareness are concerned.” [7, p. 172]

4. Psychological versus technological evolution

But, the required quick adaptation of superior psychological functions (neo-cortex), in particular the cognitive ones, as selective advantage, is unbalanced by the slower evolution of other psychic compounds (automat reactions, affects, etc.) which are still adapted for the life in nature and not in technological communities. The former generation experience is useless as long as the environment is changing too fast from generation to generation altogether

with technological development. Hence, the mandatory continuity between generations, mandatory for a healthy evolution of human species, is broken down. The technological environment overwhelms and reshapes individuals at biological level through biotic prosthesis and all kind of extensions, at social relations by replacing its traditional, face-to-face communities by virtual networking one, technological mediate social communication and relationship; and culturally through available quantity, diversity and quality of information which should be processed for decision making. As a result, the most expected psychological consequence is the breakdown of psychic balance or unpredictable transformation of human cortex functioning. Otherwise, the unbalanced tension between various parts of human cortex, which overcharges some brain function and underutilizes of others, altogether with the forced and constant re-adaptation would generates neurosis and anxieties at individual level, symptoms which have to be overcome. "No society has ever known enough about its actions to have developed immunity to its new extensions or technologies." [7, p. 64]

Let's see two such examples, of some unpredictable, but possible worrying and uncontrolled consequences induce by living within this technological material and cultural environment. Two of the main mechanisms of ensuring social stability and prevent self-destruction of Euro-Atlantic society, religiosity and morality, are directly affected by the new paradigm induced by technological progress.

In the first case, the neuro-imaging evidence for the cognitive and neural foundations of religious belief seems to support contemporary psychological theories that ground religious belief within evolutionary adaptive cognitive functions: religious belief occurs in evolved adaptive mechanisms. Functional MRI shows that specific components of religious belief are mediated by well-known brain networks employed in daily routine. There are the same mechanisms in the brain which process reality and religious matter, i.e. there is no specific religious circuits, but religiosity is integrated in brain networks used for social cognition and not in some [19]. (And similarly, as latest cognitivist accounts of the imagination mostly converge, there is a single code, pretty much the same psychological mechanisms, for both imagining and believing [20-21].) Evidence reveals that religious knowledge continuum engages two different associative processes: *doctrinal knowledge* that implies non-imaginable abstract concepts, such as 'God is ever-present' and engages networks of processing abstract semantics, whereas *experiential knowledge* engages networks involved in memory retrieval and imagery. In the latter type of religious belief, steamed from experience, imagination is used to create situations and scenes where this belief is enacted. Probably the most religious beliefs have both some abstract doctrinal and some experiential content.

There are many studies that reveal other beneficial functions of religious belief and practices, as is the neurological effect of 'brainsoothing'. This phenomenon of alleviating the cerebral tension is necessary to off-set or undoes the effects of stress that trigger biochemical reactions that release hormones which prepare, physical and psychical, a person to cope with external

perturbation and situations. If the stress condition persists to long, a neurasthenic aversive condition involving nervousness, fear, sleeplessness, and emotional instability occur. Since, stress is the natural condition of living in natural or cultural settings altogether and human psychic system is cognitive and emotional driven, one very functional way to keep the healthy balance of this is managing and to relieving the positive cognitions that offset stress by brainsoothing. In religion we find both mechanisms of enhancing positive states: cognitive processes and behavioural/emotional one. Any positive belief activate prefrontal cortex and release brain hormone with pleasant and anti-stress effects as: serotonin, dopamine, norepinephrine, and oxytocin. In the first case, the religious beliefs provide a comprehensive and holistic perspective over the dilemmas of life and death, social life traumas and offer an explanation for individual situation. For example, pleasant beliefs of the afterlife correlate positively with improved mental health [22]. “On average what is special about religion is its predictable soothing influence on brain activity and chemistry as well as its improbable ubiquity.” [23, p. 128]

In what regards effectual element of religious practices, most rituals are usually accompanied by an increase in cerebral blood flow to the amygdale and prefrontal cortex and enhanced cognitive focus [24]. Since the beneficial effects of rituals are transitory, repetition is the key for the success of religious practice. What is important for our thesis is this continuum of rational and experiential, cognition and emotion involved in religious belief. The technological induced scission of reason and affection, the emotional detachment and affective anaesthesia is likely to lead to a malfunctioning religious system of beliefs, unsupported by emotional convictions and, hence, unable to fulfil their social and ethic functions for preserving social system and sustain social evolution. On the contrary, it is prone to endorse its destructive effects as in the case of religious intolerance, fundamentalism and (suicidal) terrorism.

The second theme related with unintended dangerous and unpredictable outcome of technological development is ethical consequences of living in an artificial environment with prosthetic extensions. It is a truism the fact that any ethical active system, although it has well-established prospective and proactive functions, it is rooted in the surrounding material, social and cultural world of the participants. In other words, it is adapted and works for alleviating and increasing efficiency of people who live in a particular environment. Sometime, as an effect of excessive cognitive and work specialization, this simple fact is forgotten and the Ethics, along with its traditional reinforcement, Religion, are considered secluded realms of human existence. Moral (and religious) sentences are seen as intemporal and unhistorical universal decree. In this conditions, it is expected that adaptation to increasing technological environment to mould a different perspective over the moral realm.

This is what Lorenzo Magnani [25] daringly proposes in his book, *Morality in a Technological Word. Knowledge as a Duty*, i.e. to do exactly what Kant warned against: to treat people as if they were things, in order to learn to value people in important new ways and extend to them the kind of worth we

have lavished on certain non-human entities. This procedure could be interpreted both as the reflection of a fundamentally new way of understanding the moral realm within technological settings and as the expression of a moral legitimization of the present state of affairs. Aside from its debatable moral legitimacy, what definitely succeeded this perspective is to make visible the limitations of Kantian moral imperative, that dangerously absolutizes an unclear differentiation between humans and the rest (especially its living part). Although I am circumspect about the advantages of human 'thingness', I am totally against *the end in itself* quality of human beings, as well. I consider it is a misleading self-laudatory and false image of human person, though it represents the ideology of an (mandatory?) intermediary step in human consciousness evolution. The development of human consciousness, from the rough electromagnetic brain functioning and as a by-product of biochemical dynamics of human physiology, the self-awareness level brought by increasingly human intercourses of complex societies, and autonomous self-reliant individual consciousness of modern man were only prerequisite steps for the next level of mass consciousness: the Global Consciousness. We are only an intermediary step of the great Epos of Humanity, the development of the phenomenon of life in Universe or, rather, of the Living Universe. A long time passed until the assembly of scattered individual human consciousness arouse as a prerequisite for the formation of the unitary whole. This is the reason why the moral imperative of considering people as end and themselves is not only inappropriate, but misleading, too. Individuals are ends *for* themselves for sure, but not *in* themselves because they were made possible, and, on their turn, makes possible the Collective Being of human species.

What it would be will depend on the evolutionary winner. In the first scenario, the widespread mass of individual consciousness coagulates sooner within the global mass consciousness and the world will enter in a New Era of life evolution in Universe [26]. The other one depicts the exponentially expanding human technology that would integrate the biological evolution (including human intelligence) [13, 27]. The Evolutionary Wager is whether the human self-consciousness will evolve and crystallize faster toward a balanced and masterful new form than technological evolution will succeed to arise to a level where it will get out of human control.

Also, we will need a real 'epistemological turn' in the way of understanding the role and place of Science, and especially of human consciousness Science, Psychology, which nowadays advance in blind, following the improper mechanisms borrowed from Natural and, even worse, Engineering Sciences. This unfitted methodology and its grounding scientific principles are very questionable in terms of finality for the human self-knowledge and self-awareness and in terms of its efficiency of touching the meaningful and relevant elements of human soul. Major changes in our ways of making psychological research and counselling is expected to handle with the new and fast changing reality, and rapidly processes of adaptation on which human brain functioning is compelled, requires a faster and more profound way

to understand it in order to be able to manage and influence its future evolution and not to be driven by its blind, unintelligible and, hence, unforeseeable further development.

References

- [1] P. Duhem, *Physical Theory and Experiment*, in *Readings in the Philosophy of Science*, H. Feigl and M. Brodbeck (eds.), Appleton-Century-Crofts, New York, 1953, 235-252.
- [2] W.V. Quine, *From a Logical Point of View*, Harvard University Press, Cambridge, MA, 1953.
- [3] T. Kuhn, *The Structure of Scientific Revolutions*, University of Chicago Press, Chicago, 1962.
- [4] L. Laudan, *Science and Values*, University of California Press, Berkeley, 1984.
- [5] P.F. Anderson, *Journal of Marketing*, **47** (1983) 18-31.
- [6] S.D. Hunt, *Journal of Marketing*, **54** (1990) 1-15.
- [7] M. McLuhan, *Understanding Media: The Extensions of Man*, MIT Press, Cambridge, MA, 1994.
- [8] B. Stiegler, *Technics and Time: The fault of Epimetheus*, Stanford University Press, Stanford, 1998.
- [9] N.G. Carr, *The Atlantic*, **July/August** (2008) online at: <http://www.theatlantic.com/magazine/archive/2008/07/is-google-making-us-stupid/306868/>.
- [10] N.G. Carr, *The Shallows: What the Internet Is Doing to Our Brains*, W.W. Norton, New York, 2010.
- [11] I. Rowlands, D. Nicholas, P. Williams, P. Huntington, M. Fieldhouse, B. Gunter, R. Withey, H.R. Jamali, T. Dobrowolski and C. Tenopir, *Aslib Proceedings*, **60(4)** (2008) 290-310.
- [12] C.R. Dawkins, *The Selfish Gene*, Oxford University Press, Oxford, 1976.
- [13] D.J. Chalmers, *Journal of Consciousness Studies*, **17** (2010) 7-65.
- [14] J. Baumgartner and J.S. Morris, *Soc. Sci. Comput. Rev.*, **28** (2010) 24-44.
- [15] B. Popoveniuc, *What is a technological mentality?* in *Philosophy of Engineering and Artifact in the Digital Age*, V. Guliciuc and E. Guliciuc (eds.), Cambridge Scholars Publishing, Cambridge, 2010, 125-135.
- [16] D.A. Norman, *Things that make us smart: defending human attributes in the age of the machine*, Basic Books, New York, 1994, 3.
- [17] E. Morin, *Paradigma pierdută: natura umană*, Universitatea Al. I. Cuza Publishing House, Iași, 1999.
- [18] N. Doidge, *The Brain That Changes Itself: Stories of Personal Triumph from the Frontiers of Brain Science*, Penguin Book, New York, 2007, xx.
- [19] D. Kapogiannis, A. Barbey, M. Su, G. Zamboni, F. Krueger and J. Grafman, *Cognitive and neural foundations of religious belief*, *P. Natl. Acad. Sci. USA*, **106(12)** (2009) 4876-4881.
- [20] P. Harris, *The work of the imagination*, in *Natural Theories of Mind*, A. Whiten (ed.), Blackwell, Oxford, 1991.
- [21] A. Leslie, *Psychol. Rev.*, **94** (1987) 412-426.
- [22] K.J. Flannelly, H.G. Koenig, K. Galek and C.G. Ellison, *J. Nerv. Ment. Dis.*, **195(12)** (2007) 996-1003.

- [23] M. McGuire and L. Tiger, *The Brain and Religious Adaptations*, in *The Biology of Religious Behavior: The Evolutionary Origins of Faith and Religion*, J.R. Feierman (ed.), ABC-CLIO, Santa Barbara, 2009, 125-140.
- [24] S.W. Lazar G. Bush, R.L. Gollub, G.L. Fricchione, G. Khalsa and H. Benson, *Neuroreport*, **11** (2000) 1581-1585.
- [25] L. Magnani, *Morality in a Technological World. Knowledge as a Duty*, Cambridge University Press, Cambridge, 2007.
- [26] H. Bloom, *Global Brain: The Evolution of Mass Mind from the Big Bang to the 21st Century*, Wiley, New York, 2000.
- [27] R. Kurzweil, *The Singularity Is Near: When Humans Transcend Biology*, Penguin, New York, 2005.