COMMUNICATIONS

COMMUNICATIONS

Andrej Gogora*

THE TEXT MINING OF ETHICS AND INFORMATION TECHNOLOGY

The aim of contribution is to provide computational analysis of the journal Ethics and Information Technology by means of application of digital text mining and statistical tools on the journal's data extracted from 17 volumes. The procedure consists of data set building, application of various digital tools and interpretation of outputs. The analysis is conducted in order to acquire the basic topic structure of articles, to identify most frequently used terms, collocations and their occurrences with respect to the year of publishing, and to expose basic statistical author's data. The purpose of contribution is to present statistical overview of the journal between the years 1999 and 2016, thus to illustrate, by means of computational method, its main trends and bibliometrics data.

Keywords: *Text mining, digital humanities, bibliometrics, ethics, information technology.*

Abbreviations: *EIT - Ethics and information technology; DH – digital humanities; IT/ICT – information and communications technology*

1. Introduction

Ethical aspects of new technologies have been in focus of scholars for a relatively long time – Norbert Wiener, professor of mathematics and engineering, during the 1940s created "cybernetics", a branch of applied science in which he foreshadowed most of topical issues such as computer and security, digital privacy, ethics of programmer, information networks, virtual communities. Later on in the 1970s Walter Maner coined a new field of applied ethics "computer ethics" which is concerned with ethical problems created and aggravated by computers. After that James Moor [1] offered more profound definition of computer ethics reflecting the fundamental nature and social impact of computer technology. In the 1990s Donald Gotterbarn redefined computer ethics as a professional ethics that deals with codes of conduct for computing professionals; and finally, Floridi [2] based his "information ethics" on metaphysical assumption that world is made of informational objects (humans, animals, artifacts, electronic objects, data...) regarded as potential ethical agents.

This is a brief overview of the field of computer and information ethics. The peculiarity of the article is that it doesn't provide an armchair inquiry about particular issue of this domain, but it analyzes the representative sample of journal *Ethics and information technology* (EIT) by means of computational methods. We are asking these questions: what kind of information can be computationally retrieved from EIT corpus? What kind of digital tools can be applied to analyze EIT in order to obtain relevant statistical outputs? There are three main aims:

a) to gather and prepare digital resources and to compile EIT corpus;
b) to extract various statistical data sets from corpus and to interpret the outputs;
c) to examine methodological possibilities of applied digital tools.

The purpose is to offer the overview of computer and information ethics (represented by EIT journal) through the use of quantitative computational methods. We are going to work with digital tools that fall under the approaches elaborated in statistics, computational linguistics, natural language processing, bibliometrics and digital humanities (DH).

2. Data set

Considering the topic we decided to choose the EIT journal as a representative sample for it is included in most prestige peer-reviewed journals published in English and focused on the dialogue between ethics and ICT. In addition, it is the oldest journal exclusively dealing with the given topic and abstracted in scientific indexes with high impact factor (2014: 1.021; 2015:

* **Andrej Gogora**
Department of General and Applied Ethics, Faculty of Arts, Constantine the Philosopher University, Nitra, Slovakia
E-mail: gogora@gmail.com

0.739). There are also other journals concerning with ethical consideration of ICT such as *Information, Communication and Society*; *International Review of Information Ethics*; *Journal of Information, Communication and Ethics in Society*; *Journal of Information Ethics*; *The Ethicomp Journal*. However, processing of those resources would require the amount of time-consuming work. We claim that for the purpose of this article EIT journal represents a well-balanced and sufficient data resource.

Firstly, we downloaded set of files (.html, .pdf) from EIT website [3]. In total, we collected 502 abstracts and open access articles from volume 1, issue 1 to volume 18, issue 2 (period 1999-2016) with bibliographic data (.bib, .ris). Then, we organized files according to the year of publication, number of volume/issue, and each file renamed after specific DOI number. Then we automatically converted all files (.html, .pdf) into text format (.txt) and manually corrected scattered footnotes, page numbers, paragraphs and special characters. Considering the original articles layout we identified a set of key elements – journal, year, volume, number, pages, DOI, title, author, affiliation, author's address, e-mail, abstract, keywords, text, section, subsection, paragraph, footnotes, references and acknowledgment. Each element contains particular information that can be computationally utilized. For our purpose we processed just year, DOI, title, author/s, affiliation, address, abstract, keywords and open access articles text (we stored away references and footnotes for further research). Finally, we obtained basic data set with 1,471,502 total words and 18,137 unique word forms.

Regarding the building of resources, we have to point out that this phase of digital research is commonly the most laborious and long-lasting one. On the other hand, it's highly probable that producing of widely accessible and applicable digital resources would stimulate the research activity – after the compiling of CEPHIT corpus [4] a number of corpus-based studies raised. Thus, it is crucial to support the creating of utilizable digital resources [5, p. 80-82] as well as making of hand-lists of resources [6].

3. Digital tools application

In the next section we present the result of computational processing – instead of a single tool we intentionally applied various types of accessible text mining tools within the limits of our data set. It follows that we don't postulate a specific philosophical hypothesis that would be computationally resolvable. Our aim is to demonstrate the methodological potential of digital text analysis for the needs of ethics and philosophy.

3.1. Corpus terms

In the first step, we chose a standalone version of Voyant Tools [7] a web-based text analysis environment, to retrieve the ordered list of most frequent words from tokenized EIT corpus. The first 10 terms in raw (total count) frequency are: information (14.916), privacy (8.474), moral (8.425), data (6.927), ethical (6.313), human (6.297), social (6.112), technology (5.712), ethics (5.237), computer (4.650). It perfectly matches with basic themes covering EIT journal as were declared in the first editorial [8, p. 3]. By the same tool and manual filtering we obtained a list of most frequent authors and ethical trends. Statistically, the result shows that besides contemporary scholars specialized in ethics and new technology: Floridi (1.194), Nissenbaum (309), Lessig (215), Allen (162), Friedman (139), van den Hoven (132), Coeckelber (128), Tavani (120) there is ongoing dialogue between traditional theories and authors such as Kant (1.029), Aristotle (660), utilitarianism (500), consequentialism (304), Heidegger (249), deontology ethics (236) or Kierkegaard (171). In addition to elementary statistics, this function is often the basis for another text mining analysis, for example, the tracking of changes of term frequency according to various criteria.

Moreover, considering the data representation we notify that Voyant as well as other end-user tools include powerful functions to visualize statistical-linguistics data. The Voyant functions such as "Trends" (Fig. 2), "Bubblelines", "ScatterPlot" fulfill the requirement of visualization to communicate the piece of knowledge and to help others to acquire new knowledge.

3.2. Vocabulary density

In the next step, we provide the vocabulary density statistics (in Voyant) that is defined as the number of lexical words (content words) divided by the total number of words. Simply, lexical density is a measure of how informative a text is. In this case, it's indicative that first 5 documents with highest vocabulary density are editorials and book reviews. It's explicable by short document length of these texts that brings about higher vocabulary density. In the same way, Fig. 1 shows distribution of vocabulary density across EIT by years – it illustrates that in the first 7 years (except of 2002) there is a noticeable increased incidence of higher vocabulary density then in subsequent years. It is also explainable by the direct proportion of high lexical density of given year to short document length – or more precisely, the longer text contains more re-used (non-unique) words that reduce lexical density. Johansson [9] provides an overview of solutions to problem of lexical density of texts of different lengths (VocD, Type-Token Ratio, Theoretical vocabulary analysis). Basic end-user text mining tools do not include these algorithms, however in the case of successful vocabulary evaluation, this function may

be contributive in comparing authors, genres, text types in terms of information value.

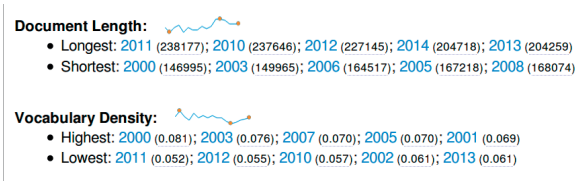


Fig. 1 Document length and vocabulary density

3.3. Collocations

Another useful feature is "Collocation Tool" that allows to search for collocations of a particular term. In this case, we took advantage of AntConc [10] software that offers more setting options for this function than Voyant. Firstly, we generated lemmatized word list (along with using basic stop-list) and then, according to top 10 terms and the interest to find out which types of ethical theories are most frequently used in EIT, we decided to look up the collocations of "ethics". We configured a query to find out all first left collocations (1L_"ethics") and to sort them out by frequency. First 10 1L collocations of "ethics" are: computer, information, applied, virtue, machine, business, discourse, global, environmental and professional. It is remarkable that bulk of the total amount consists of computer ethics (923) and information ethics (490). Statistically, it confirms the importance of these fields as we have indicated in the introduction (Fig. 2). Moreover, third right collocations of "ethics of" ("ethics of"_3R) aptly suggest the common areas covered by ethical reflection: ethics of technology, ethics of information, ethics of robotics, ethics of research, ethics of computer, ethics of warfare, ethics of care, ethics of surveillance, ethics of internet, ethics of games. Considering other frequent terms in EIT, 1L collocations of "information" are: personal, genetic, medical, digital, sensitive, health, global and private. 1R collocations of "moral" are: responsibility, agency, consideration, status, value, philosophy. Finally, 1R collocations of "social" are: media, network, justice, context, relation. These figures confirm the anticipated phrases most frequently occurring in general overviews of ethics and ICT [11, p. 25-48].

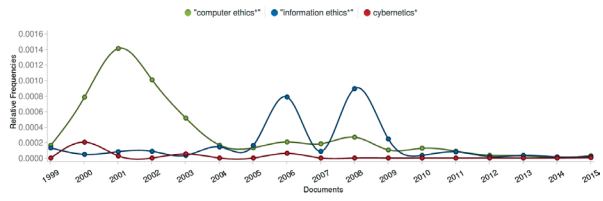


Fig. 2 Trends of collocations by years

Collocation demonstrates the sequence of words that co-occur with a frequency greater than a chance, thus it indicates the habitual juxtaposition of terms in the field of ethics and ICT. This contribution is useful in considering terminology or in more complex overview of a specific domain. Moreover, linking of various digital tools and data types, for example, searching for multiple overlapping collocations in combination with analysis of distribution of terms within the structured units of corpus, would produce valuable results (see project *Minerva – Data visualization to support the interpretation of Kant's work* [12]). The limits of computing are in principle restricted by scholar's requirement.

3.4. Cluster analysis

The cluster analysis is text mining practice in which the task is to group terms on the basis of their relatedness; it means the distance between terms in text (the smaller the distance between terms, the stronger are related to each other). It follows that terms in the same group are more similar to each other than to those in other groups – each cluster may be seen as a topic. In our case, we used VOSviewer software [13] that support creating network maps based on terms co-occurrences in documents. Our task is to build up a cluster map of the co-occurrence relations between key terms in EIT corpus. We reduced the minimum number of occurrences of a term (noun phrase) at least to 100 and it resulted in 365 terms from which we manually excluded irrelevant terms (general or non-informative). VOSviewer generated a 2-D map (Fig. 3) in which terms are located according to their co-occurrence frequencies (smaller distance = stronger relation).

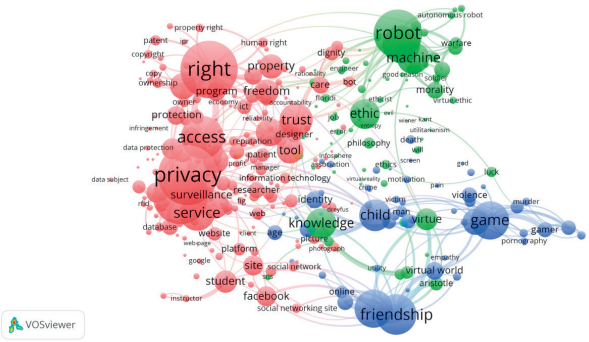


Fig. 3 Clusters network of EIT

We have to point out that the map has a number of limitations based on data availability and graphical simplification. It should be treated as an auxiliary tool to improve the knowledge of certain domain, not a perfectly valid representation. However, it is possible to suggest some findings. In brief, we can identify three main clusters in different colors with more or less central terms. First one (red) is concentrated around terms with highest

frequency of co-occurrence: privacy, right, data, access. Second one (green): ethics, robot, human, machine, knowledge; and third one (blue): friendship, game, virtual world, player, identity. In general, these clusters are the most frequent topics in EIT – dominance of "privacy/right" and "ethics/robot" clusters is not a surprise, both of them are prominent manifestations of ICT in ethics literature. Heersmink et al. [14, p. 241-249] conducted similar research by analyzing only titles and abstracts of 1.027 articles from EIT (2003-2009) and other journals. In comparison, our three clusters relatively fit their results, but in the third one there is a significant absence of the term "internet" in our map. It may be explained by the fact that the frequency graph of "internet" in corpus shows that it has the highest incidence between 2000-2003, but in the following years it is greatly reduced (on the other hand, terms "privacy" and "data" have very similar trend graph - Fig. 4). Finally, this kind of topical macro-view is for our purpose sufficient, however the further challenge is to conduct a more complex analysis of distributional semantics in natural language processing [15, p. 394-428].

3.5. Authorship's bibliometrics

Another kind of bibliometric method is statistical analysis of authorship and co-authorship. By means of VOSviewer and RIS files containing bibliographic data we received the list of authors (496) with the largest number of published articles in EIT: Floridi (14), Tavani (14), Coeckelber (8), De Laat (8), Spinello (8), Van den Hoven (8), Ess (7); and also the most frequent co-authorship: Tavani (7), Grodzinsky (5), Floridi (4), Johnson (4). On the basis of these data VOSviewer created the map of co-authorship (Fig. 5). This bibliometric result has no serious heuristic importance; nevertheless it provides the synoptic view of co-authors relationships useful in meta-philosophical or discourse analysis. Moreover, these network data may be later used for analysis of author's impact by comparing the number of his articles and occurrence of the most frequent topic clusters.

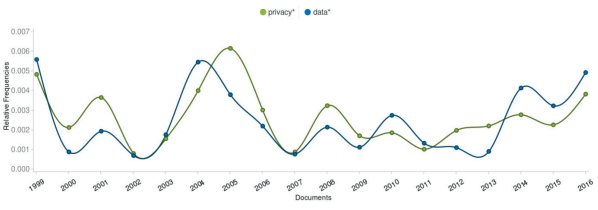


Fig. 4 Trends of "privacy" and "data" by years

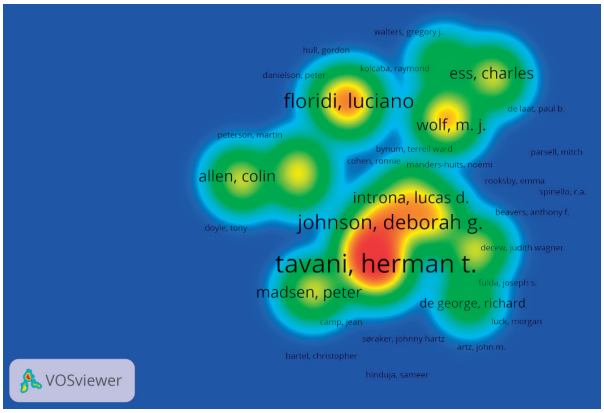


Fig. 5 Co-authorship density map of EIT

3.6. Geo-mapping

According to author's contact information in header of EIT articles, as well as given the data from previous analysis, we constructed a geographical map with layer compounds of affiliation localities. Firstly, we created a CSV spreadsheet consisting of author, affiliation, city, country, year and geocoding data (longitude, latitude). Then we calculated occurrences (including co-authors) and compiled the list of most frequent countries: USA (299), UK (106), Netherlands (101), Australia (52); cities: New York (39), Delft (56), Oxford (55), Enschede (26), Eindhoven (20), Lancaster (19); affiliations: University of Oxford (24), Technical University Delft (23), University of Twente (22), Rivier University (16), Charles Sturt University (13), Boston College (10), Lancaster University (9), Eindhoven University of Technology (9), Dartmouth College (9), CUNY (9), Carnegie Mellon University (8). Then, we uploaded CSV data set to online tool CARTO [16] and generated the interactive geographical map displaying localities, their frequency and timeline (Fig. 6). The results confirm that majority of EIT articles originate in the USA, UK and Netherlands – it is easily explainable by the country of origin of Springer publishing company (NY, USA); Springer Humanities Department based in the Netherlands; the composition of editorial board; and last but not least the English language and professional competency. However, the timeline map displays that there is an increase incidence of articles coming from other parts of the world in the last years (it fulfills the strive for international relevance in EIT editorials). In addition, there is no contribution from Central Europe region.

4. Conclusion

In conclusion, we demonstrated the way in which it is possible to apply end-user text mining software (Voyant, AntConc, VOSviewer, CARTO) to particular corpus data set. The purpose

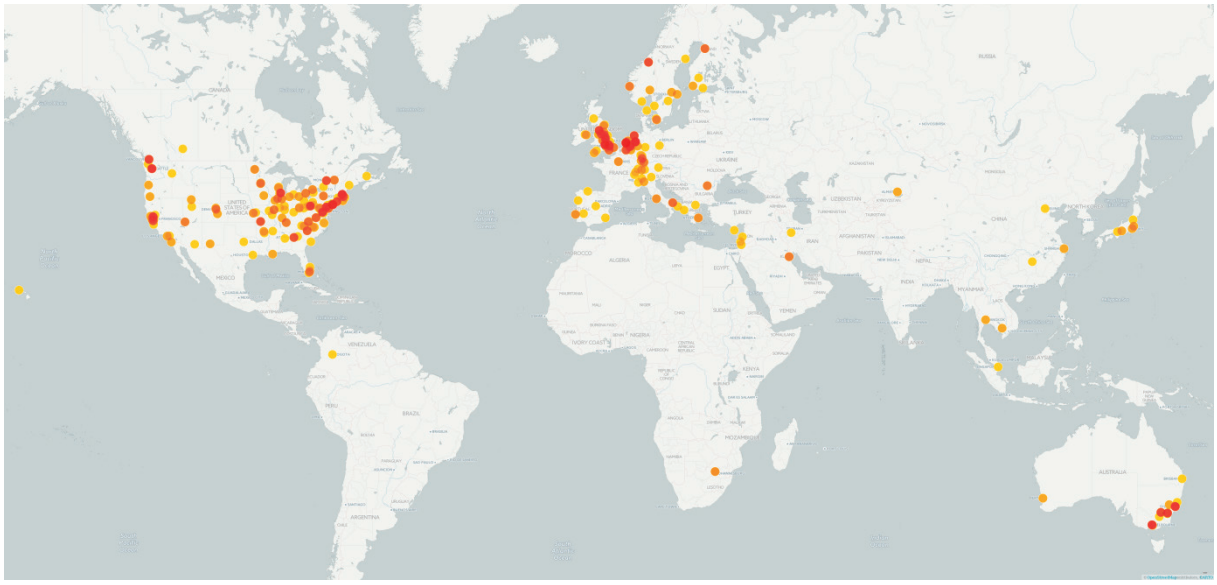


Fig. 6 Geographical map of affiliation occurrence

was to evaluate the applicability of these standardized digital tools, and to provide the basic statistical and bibliometric over-view of 16 volumes of EIT. In general, this task coincides with interdisciplinary challenge of DH to extent the benefits of digital research to practice of humanities, namely philosophical disciplines [17].

Firstly, we showed the outcome of basic term frequency analysis, interpreted it and suggested the potentiality of this data source for further research. Afterward, we tried to measure out the vocabulary density of articles, but we found out that available end-user tools are not able to accurately compare documents with different length – it needs to be processed by complex algorithms. Then we retrieved collocations of particular terms and by interpretation confirmed correctness of these results. Later on, we built up and mapped the clusters of co-occurring terms, and interpreted it according to general trends in computer and information ethics. In this case, we indicated the great opportunity to proceed with advanced types of computational semantic analysis. Lastly, we provided bibliometrics analysis of authorship and co-authorship data, and the map displaying the localities of authors´ affiliations (in respect to bibliometrics there remains the task to survey articles references).

Finally, we claim that beside the review of applicability of text mining tools we offered new pieces of knowledge concerning EIT journal. Some of them validate or contradict intuitive suppositions in a quantitative way, another one may inspire to create new interpretations or to suggest original hypotheses, but we have to draw attention to the fact that all of these digital tools are merely supportive instruments for philosophical-ethical inquiry.

Acknowledgement

The paper is part of grant project realized at the Institute of World Literature, Slovak Academy of Sciences, VEGA 2/0107/14, Hypermedia artefact in the postdigital age, 01/2014 – 12/2017.

References

[1] MOOR, J. H.: What is Computer Ethics? *Metaphilosophy*, vol. 16, No. 4, 1985, 266-275. ISSN 1467-9973.

[2] FLORIDI, L.: *Philosophy and Computing: An Introduction*. New York: Routledge, 1999. ISBN 0-415-18025-2.

[3] Available on the Internet at: http://www.springer.com/computer/swe/journal/10676

[4] MOSKOWICH, I., CAMINA, G., LAREO, I., CRESPO, B.: *The Conditioned and the Unconditioned: Late Modern English Texts on Philosophy.* Amsterdam: John Benjamins, 2016. ISBN 978 90 272 1229 0.

[5] KONVIT, M.: On Access to University Information Resources. *Communications - Scientific Letters of the University of Zilina*, vol. 14, No. 1, 2012, 80-82. ISSN 1335-4205.

[6] KRALIK, R., PAVLIKOVA, M.: The Reception of Kierkegaard's Work in Slovakia (in Slovakia). *Filozofia*, vol. 68, No. 1, 2013, 82-88. ISSN 0046-385X; KRALIK, R.: The Reception of Soren Kierkegaard in Czech language (in Czech). *Filosoficky casopis,* vol. 61, No. 3, 2013, 443-351. ISSN 0015-1831.

[7] Available on the Internet at: http://voyant-tools.org/
[8] VAN DEN HOVEN, J., INTRONA, L. D., JOHNSON, D. G., NISSENBAUM, H.: Editorial. *Ethics and Information Technology*, vol. 1, No. 1, 1999, p. 3. ISSN 1388-1957.
[9] JOHANSSON, V.: Lexical Diversity and Lexical Density in Speech and Writing: A Developmental Perspective. *Department of Linguistics and Phonetics: Working Papers in Linguistics*, vol. 53, 2008, pp. 61-79, *Lund University.*
[10] Available on the Internet at: http://www.laurenceanthony.net/software/antconc/
[11] BYNUM, T. W.: Milestones in the History of Information and Computer Ethics. *The Handbook of Information and Computer Ethics*. Kenneth E. Himma, Herman T. Tavani (eds.), New Jersey: John Wiley & Sons, Inc., 2008, 25-48. ISBN 978-0-471-79959-7.
[12] Available on the Internet at: http://www.densitydesign.org/2013/08/minerva-data-visualization-to-support-the-interpretation-of-kants-work/
[13] Available on the Internet at: http://www.vosviewer.com/
[14] HEERSMINK, R., VAN DEN HOVEN, J., VAN ECK, N. J., VAN DEN BERG, J.: Bibliometric Mapping of Computer and Information Ethics. *Ethics and Information Technology*, vol. 13, No. 3, 2011, 241-249. ISSN 1388-1957.
[15] FOX, CH.: Computational Semantics. *The Handbook of Computational Linguistics and Natural Language Processing*. Alexander Clark, Chris Fox & Shalom Lappin (eds.), Wiley – Blackwell, 2010, 394-428. ISBN 978-1-4051-5581-6.
[16] Available on the Internet at: http://www.carto.com/
[17] BRADLEY, P.: "Where Are the Philosophers?" Thoughts from THATCamp Pedagogy. *J. of Digital Humanities*, vol. 1, No. 1, 2011. ISSN 2165-6673.

Branko Klun*

MODERN TECHNOLOGY'S EFFORT TO MASTER TIME AS A CHALLENGE FOR ETHICS

Modern technology has been striving to free humans from their subjection to space and time since its very beginnings. Overcoming spatial distances, intrinsically linked to the phenomenon of globalisation, and the parallel process of gaining mastery over time by new means of production and communication, has promised to bring man closer to a fulfilled life. However, instead of giving us more time for an authentic existence, the acceleration of time in modernity (as analysed by sociologist Hartmut Rosa) has led to a chronic lack of time and poses a general question of a good life and ethics. In this article, I intend to refer to Heidegger's view on the essence of modern technology as an endeavour to win victory over time, and the need of philosophical reflection regarding the positive nature of time. However, authentic time cannot come about without relationships to our fellow humans, and Levinas' account of temporality will serve as both a correction to Heidegger's position and a way towards an ethical consideration of time.

Keywords: *Technology, time, acceleration, Heidegger, Levinas, Rosa.*

1. Introduction

We live in a time characterised by a peculiar paradox to time itself: on the one hand we have gained much time through the help of modern technologies, but, on the other, we seem to be suffering from time pressure more than at any other time in history. This dichotomy between our apparent growing mastery and constant lack of time poses various ethical questions that not only relate to moral challenges which require time for well-weighed decisions, as opposed to the increasingly high speeds of new technologies, but more importantly to our contemporary way of life. Since its Greek beginnings, a central question of ethics has revolved around *the good life*. This question, with its temporal dimension, is still of fundamental importance today, as this is a life in time, and achieving it is intrinsically connected to the question of how one lives or spends their time.

In this paper, I will first present some aspects of the sociological theory on our contemporary time from German sociologist Hartmut Rosa, whose analyses of (post)modern society centre on the concept of *social acceleration*. He believes that it is by means of temporal structures that we can best understand (post)modern society's development [1], and technological progress plays a key role in this process of acceleration. However, in addition to this sociological analysis we can also ask a philosophical question regarding the existential presuppositions for such a historical development. Heidegger's well-known reflections on the essence of technology aid in discerning the hidden agenda behind this process, which is none other than man's attempt to master time. This striving, however, brings us to fundamental questions about the relationship between our existence and time; between life and temporality, and these questions will be addressed in the last section of the paper.

2. The paradox of technological acceleration and the scarcity of time

Rosa's overall ambition is to provide a theory of modernity by analysing the temporal structures which underlie its historical development. The passage from the pre-modern epoch to the modern one is marked by a transition from the "static historical perspective" to a directed process with "the idea of progress" [1, p. 290], which includes a temporal index of its development. Temporality is related to changes to different levels of society, and these changes are taking place at an increasing speed. For Rosa this process of acceleration becomes *the* distinctive feature of modernity and he distinguishes three dimensions which stand in a close relationship to each other [1, p. 71]. First there is *technical acceleration*, with the impressive development of science and technology. This acceleration is largely, but not solely, responsible

* **Branko Klun**
Faculty of Theology, University of Ljubljana, Slovenia
E-mail: branko.klun@teof.uni-lj.si

for the *acceleration of social change*. If we think of periods within which certain technological devices affected and shaped our life until they were succeeded by new devices (e.g. radio, television, internet), and consequently by new ways of social behaviour, a shortening of these time periods can be observed. It is therefore no surprise that this acceleration of social changes also affects individual life experience, and leads to *the acceleration of the pace of life*. This subjective experience of an increased tempo, which produces a constant feeling of pressure, or lack of time, stands in stark contrast to technical acceleration, which has brought us enormous gains in time, but nevertheless, and paradoxically, leaves us feeling like we have less.

So, the three dimensions enhance each other in what Rosa calls "the circle of acceleration" [1, p. 151]. Technical acceleration provokes an increase of social changes which, in turn, speed up the pace of life. A high-paced life then demands more technical support and faster services, and so the circle is completed – acceleration becomes a self-propelling process. Although there are certain obstacles to acceleration, which Rosa describes as categories of inertia (such as natural limits to speed or intentional deceleration) [1, p. 80], these cannot fully stop or reverse the process, and this is further stimulated by other external forces. For example, Rosa speaks of the economic motor (best summed up in the phrase "time is money"), the cultural motor (the imperative of a fulfilled life) and the socio-structural motor (connecting the increasing complexity of today's world) [1, p. 194]. The overall result is the accelerated society which shapes our lives today.

In this presentation I want to focus on a dimension of technical acceleration which Rosa analyses under three aspects [1, p. 104]. Our impressive development of technology first revolutionised our relationship to space (*acceleration of transportation*), then our relationship to fellow human beings (*acceleration of communication*), and finally our relationship to things (*acceleration of (re)production*). First, distances in space are being overcome in increasingly shorter times, and information technology, with its high-speed data transfer, is also contributing to a change in our experience of space. Sociologist Manuel Castells observes a transition from a "space of places" to the "space of flows" [2]. The internet is an extreme example of spacelessness, as events within it seem to happen everywhere and at the same time. Second, information technology has also profoundly changed the realm of communication, which is no longer conditioned by spatial distances and time-consuming mediations (e.g. classical letters), and today there is a visible tendency towards *live* or *real-time* reporting. Paul Virilio criticised this "*globalized expansion of the present*" [3] within his comprehensive diagnosis of modern society. Live-reporting on TV may seem to be closer to "truth", but in reality it includes an increased possibility for manipulation when "individuals are being subconsciously influenced by the omnipresent normative images and messages of economic, political, and cultural marketing ads and media content" [4, p. 135]; the real-time flow of images, which overwhelms the recipient, appeals only to his emotions and leaves no time for reflection. This speed-of-light communication wins over time, but also suppresses our existentially lived temporality, and does not allow recipients to create an integral experience of an event. This same criticism applies to communication between individual persons, as it remains questionable whether an immediate and constant connection increases the quality of their relationship.

Finally, there is the third dimension, our relationship to things, as production times decrease alongside product lifespans. The economic drive of continuous growth in production, which requires an ever-faster rate of consumption, has changed the role and value of things in our lives with far-reaching effects, not only for our environment and its limited resources, but also in terms of our very way of our being. Our existence is caught in a spiral of acceleration: time is constantly being gained by means of technical optimisation, but we experience a perpetual lack or scarcity of it.

3. Heidegger's account of technology and the question of time

Jonathan Trejo-Mathys has observed parallels between Rosa's social criticism, based on a temporal-structural approach, and Heidegger's philosophical analysis of the relationship between being and time [5] but he does not further explore their possible convergences. For our purposes, however, it will prove worthwhile to consult Heidegger's philosophical views to better understand the sociological theory of our accelerated society.

Heidegger's interpretation of technology seeks to be more than a mere philosophical analysis of this major phenomenon in modernity: technology is not merely a sum of technological devices and techniques, but is also a special mode of thought, characteristic of our modern age. In order to find the essence of technology we cannot just analyse the technological products which are increasingly inhabiting and determining our world, meaning that the danger of technology lies not only in the devices themselves (e.g. the nuclear bomb). It would be equally short-sighted if we misconceived of technology as a mere instrument at man's disposal, subject to his moral decisions [6]. In the latter case technology would only be as dangerous as man is capable of its misuse and moral failure. Heidegger demands a deeper view of technology and asks transcendental questions: "What makes the whole of technology possible?" and "What sort of human intentional approach to reality stands behind the rise of modern science, which brought about this awesome technological development?" He does not accept the common belief regarding (modern) science as a theoretical fundament for technology and its practical fruits. Rather, he accuses modern, mathematised science as being "technical" at its very essence. Science is "the theory of the real" [6, p. 157], where *theoria* means a way of viewing and understanding reality. However, this way of viewing and

approaching the world is not a rational necessity; it is a historical possibility. Heidegger challenges our prevalent opinion of modern science and technology as the peak and highest expression of rationality's historical development. For him, modern (scientific and technological) rationality is a contingent historical event, and belongs to the destiny of Western civilization. Furthermore, this rationality is an event that has brought us away from authentic life, and is largely responsible for what Heidegger refers to as the forgottenness and abandonment of being [7].

I do not intend to enter into a full range discussion on Heidegger's views, and here I am limiting myself to just one aspect which has often been neglected in commentaries on his position regarding technology: the aspect of time. One would look in vain for references to time in Heidegger's major essays on technology, but this issue nevertheless pervades them all. Namely, it is the absence – or more precisely, the forgottenness – of time that constitutes the essence of technology and correlates with the forgottenness of being. Our present age, dominated by technology, is for Heidegger only the last stage in the historical epoch succinctly called metaphysics. Metaphysics does not stand first and foremost for a discipline in philosophy, or for the quest of the suprasensible, but for a specific way of thinking which guided the development of Western thought into a particular direction, and caused a "fall" from authentic being. So, with Plato, as the father of metaphysics, what occurred can be described as a mistrust of time, and an attempt to overcome it. True being was recognised as *eidos*, or *idea* - i.e. a timeless essence of things, which is not subject to temporal changes, but "endures as present" [6, p. 20]. Time became a negative connotation, working against stability, and responsible for the contingency and finitude of all being(s).

This metaphysical identification of true being with timelessness (and eternity) has its deepest roots in the existential desire to overcome the temporality and finitude of our own existence. So, gaining mastery over time meant securing a timeless meaning for our finite existence, and behind this attempt to conquer and suppress time Heidegger recognises the will to power and domination. However, according to him, this brings man away from a true and authentic existence, in which time should be acknowledged in a constitutive and positive way. The more we desire to master our existence outside of its lived temporality, the more we lose it. Our being (existence) is given to us in time and above all *as* (a lived) time. Heidegger thus demands a different attitude towards time and its finitude: it should be honoured as a positive (although finite) horizon, wherein life (or being) is able to come into its own authenticity.

It is now easier to understand Heidegger's provocative thesis that the technological thinking of our modern age is both the heir and completion of Western metaphysics [8]. The essence of technology, according to Heidegger, is "en-framing" [6, p.19] wherein the ancient "idea" reverberates, but in an even more radicalised way. Enframing denotes a certain vision of reality, which is now perceived (Heidegger would say "revealed") as an object at our disposal, and subject to our "framing". The word "frame" conveys the original intention of Heidegger's *Gestell*, since it stands for a stable structure which has no relation to time. Time itself is "framed" and given a technical meaning: it is conceived of as a linear flow and expressed in a mathematical way. When such technical thinking turns back to the self-understanding of man and his existence, we face the paradox of today: the more we want to technically control and master our life and its lived time, the more we experience this life fading away.

4. Towards a new consideration of time and the question of meaning

Social acceleration as described by Rosa can be supported by Heidegger's explanation of the metaphysical desire to master time and escape death. Rosa writes that "acceleration [...] becomes a secular substitute for eternity, a functional equivalent for religious ideas of an eternal life and thus a modern response to death" [1, p. 310]. However, the ambition behind acceleration is accompanied by another experience – despite our ever-faster pace of life, there is a feeling that nothing really new is happening; that there is a rigidity behind this ongoing acceleration and that time is standing still. Virilio describes this phenomenon as a "polar inertia" [9], a constant circular movement in which nothing really changes or moves. Perhaps Heidegger's notion of enframing tries to philosophically address this feeling of standstill in the apparent acceleration. However, while he identifies boredom as the basic mood of our time [10], Rosa points to depression, which has become one of the world's most common sicknesses, and can be "conceived as a *pathology of time*" [1, p. 248]. Still, both would agree that our unauthentic relationship to time in today's accelerated society cannot be overcome by individual decisions alone. For Rosa, we are embedded in society's temporal structures, which condition our individual life, and Heidegger seems to offer no solution other than a mysterious wait for the advent of a new historical age of (more authentic) being.

Nevertheless, we should not succumb to resignation, and Baudrillard's "ironic vision of the entire scientific and technological process" [11] does not seem to be the right answer either. Baudrillard recognises the consequences of extreme acceleration, which leads to a hyperbolic congestion of time in instantaneity, what the media call real-time, and speaks of a "prefect crime" [12] perpetrated against time itself: "for with the ubiquity and instant availability of the totality of information, time reaches its point of perfection, which is also its vanishing point. Because, of course, a perfect time has no memory and no future" [11, p. 64]. The vanishing of time leads to a vanishing of meaning. This is the crucial point, since real time (instantaneity) allows for no thinking, for no reflection (which by its very prefix "re-" requires a distance that includes a time interval); it remains in the ambiguity of all possible meanings [11, p. 51] and thus falls prey

to manipulation. For the same reason Virilio holds the view that no politics is possible in real time, and criticises the development of democracy towards "dromocracy" [13] (Gr.: *dromos*, race). The same can be said for ethics. Despite our increasingly faster technology, man should be able to "take his time" in order to think and ask the question of meaning, and Heidegger sees a direct correlation between meaning and time. Man is the only being who lives in the way of understanding, of giving meaning to his own doing and to the world around him, but this openness to the world and to himself (or man's consciousness) is constituted by his specific (existential) temporality. According to Heidegger, time is not accidental to human subjectivity, but constitutes its very "substance": we not only have time, but we "are" time. This lived time is inextricably linked with our understanding. A meaning – as a constitutive part of understanding – can only be created within a horizon of time. We could say that today's omnipresent acceleration contracts the horizon of time and endangers the constitution of meaning.

The main ethical challenge of today is not the constant effort to safeguard our autonomy by securing safe heavens of (spare) time in the battle against acceleration, but rather the actualisation of the age-old question on the good life, which can also be translated into the question on the meaning of life. Is the good or fulfilled life one which is "filled up" with as many realised options, experiences, and adventures in a lifespan as possible – as the prevailing image of a successful life today seems to suggest? [14]. Or, should we be searching for an alternative, a decelerated way of life, by embracing the nostalgic ideal of a contemplative and simple life, usually accompanied by the romantic refusal of technology altogether?

In conclusion, I would briefly like to refer to an altogether different view of time put forth by Levinas: the bold thesis that time cannot authentically be experienced by an isolated subject [15]. It is only after another person enters my life that I overcome the boring duration of my inauthentic temporality [16]. For Levinas, the ultimate meaning of time is the paradoxical experience of giving *my* time to *another* person in a living relationship, something which should be conceived of as their ethical responsibility for each other. It is in fact a paradox – as is the entire ethical philosophy of Levinas – because our time seems to be inalienable from us, and cannot be given to another person. Yet, Levinas insists on this possibility as the highest vocation of life, and as a true metaphysical desire beyond the will to power and domination. Even in our age of technology, with our constant lack of time, we still have enough time to give to (or spend for) our fellow humans.

With regard to accelerated time today, it therefore seems to be a twofold task before us. First, we should be able to make time for ourselves, and not allow it to be suppressed by the frenetic circle of acceleration. This, however, does not mean detaching oneself from the commitments of everyday life. Rather, it means having a different attitude towards the actions and events we are engaged in. Heidegger calls this attitude "serenity", or "composure" (*Gelassenheit*), and takes this notion from Meister Eckhart. In serenity we do not seek to dominate things. Instead, we let them be (*seinlassen*). In a serene and calm (*gelassen*) attitude we also let time be; we "give time time". Serenity prevents us from getting absorbed in the frenetic course of our daily routines and allows us to reflect upon the meaning of our doing, and of our life in general. The second task, as advocated by Levinas, refers to the call and needs of other people. Serenity cannot mean a passive tolerance or indifference ("let them be") towards fellow humans, but should lead to an active engagement, in the sense of making time for other people. To have time for others is to give my time a new, transcendent meaning. In such a way, both a serene composure and a responsibility for others represent an alternative way in which to come to terms with today's world of technology and its increasing acceleration. It allows us to be *in* this world, but not be *of* it.

References:

[1] ROSA, H.: *Social Acceleration. A New Theory of Modernity*. Trans. J. Trejo-Mathys: New York: Columbia University Press, 2013. ISBN 9780231519885.

[2] CASTELLS, M.: *The Information Age: Economy, Society and Culture I.*: *The Rise of the Network Society,* 2nd ed., Oxford: Blackwell, 2010, 453. ISBN 9781405186964.

[3] VIRILIO, P.: *Open Sky*. Trans. J. Rose. London: Verso, 1997 [1995], 134. ISBN 1859841813.

[4] VALCO, M.: Rethinking the role of Kierkegaard's 'Authentic Individual' in liberal capitalist democracies today. *European J. of Science and Theology*, vol. 11, No. 5, 2015, 129-139. ISSN 1841-0464. See also: SLIVKA, D.: Vplyv medii na socialne a kulturne hodnoty sucasnosti I. Presov: Presovska univerzita, 2010, 77.

[5] TREJO-MATHYS, J.: Translator's Introduction: Modernity and Time. In H. Rosa: *Social Acceleration. A New Theory of Modernity*. New York: Columbia University Press, 2013.

[6] HEIDEGGER, M.: *The Question Concerning Technology and Other Essays*. Trans. W. Lovitt, New York: Garland, 1977, 5. ISBN 0824024273.

[7] HEIDEGGER, M.: *Contributions to Philosophy. From Enowning*. Trans. P. Emad & K. Maly. Bloomington: Indiana University Press, 1999, 79ff, ISBN 0253336066.
[8] HEIDEGGER, M.: *Mindfulness*. Trans. P. Emad & Th. Kalary. London: Continuum, 2006, 151, ISBN 9781441178404.
[9] VIRILIO, P.: *Polar Inertia*. Trans. P. Camiller. London: Sage, 2000 [1990]. ISBN 0761958037.
[10] HEIDEGGER, M.: *The Fundamental Concepts of Metaphysics. World, Finitude, Solitude*. Trans. W. McNeill & N. Walker. Bloomington: Indiana University Press, 2008, 74. ISBN 9780253214294.
[11] BAUDRILLARD, J.: *The Vital Illusion*. Ed. J. Witwer. New York: Columbia University Press, 2000, 53. ISBN 0231121008.
[12] BAUDRILLARD, J.: *The Perfect Crime.* Trans. C. Turner. London: New York: Verso, 1996 [1995]. ISBN 1859840442.
[13] VIRILIO, P.: *Speed and Politics: An Essay on Dromology*. Trans. M. Polizzotti. New York: Semiotext(e), 1986 [1977], 46. ISBN 0936756241.
[14] GRONEMEYER, M.: *Das Leben als letzte Gelegenheit. Sicherheitsbedürfnisse und Zeitknappheit,* 2nd ed., Darmstadt : WBG, 1996. ISBN 9783534801480.
[15] LEVINAS, E.: *Time and the Other*. Trans. R. A. Cohen. Pittsburgh: Duquesne University Press, 1987, 39. ISBN 0820701831.
[16] Kierkegaard seems to take this point even further, maintaining the human self is essentially relational, as Valco correctly points out. See: VALCO, M.: Kierkegaard's Sickness unto Death as a resource in our search for personal authenticity. *European J. of Science and Theology*, vol. 12, No. 1, 2016, 97-105. ISSN 1841-0464. "The human self is a true self precisely because it realizes itself and is able to enter into an inner dialogue with itself. This would not be possible, according to Kierkegaard, if human being were a static essence, established without any constitutive relation to the Other." Ibid. 101. The lack of proper relation of the self to the Other ends, according to Kierkegaard, in despair.

Jarmila Jurova*

DO THE VIRTUAL COMMUNITIES MATCH THE REAL ONES? (COMMUNITARIAN PERSPECTIVE)

The paper traces the concept of 'responsive' (real) community as defined by communitarians. Responsive community is defined as a morally valued way of life characterized by a shared set of values. This concept of community embodies the idea that human beings are fundamentally related to each other through social bonds and value consensus that enable stable relationships among the members. However, a new kind of community – the virtual/online community – has appeared due to the modernization and information technology development in society. Individuals interacting online are often loosely linked by specialized instrumental ties and the boundaries of virtual/online communities seem to be fluid and association among members ephemeral. From the communitarian perspective of a community responsive to the needs of its members as well as demands of society, the author attempts to find out if the virtual communities still meet the conditions of 'real' communities.

Keywords: *Responsive community, virtual community, shared values, communitarianism.*

1. Introduction

Nowadays, there are many discussions regarding virtual or online communities among scholars as well as wide public. They are mostly discussing the issue of privacy protection, individual freedom, openness, responsibility, equality, truthfulness and morals of such a way of communication and socializing compared with the real off-line social relationships. Based on the communitarian concept and understanding of community, I will try to find the answer to the question of *How much the virtual communities match the real ones in the sense of their main features and requirements*. On the one hand, many scholars, e. g. Postill [1], Yuan [2], Wittel [3] etc. are now concerned that voluntary, fluid and ephemeral social relationships online do not bear out the deeply embedded human interdependence embodied in the concept of traditional community, despite its normative appeal, and that human relations in computer-mediated communities cannot be as intimate, strong, and affect-laden as in real communities. On the other hand, initial research on online community showed many cases of intense feelings of solidarity, empathy and support that people generate when interacting in virtual environments, which relates well to the emotional and normative dimensions of the community concept, and therefore helped legitimize the conception of (digitally) networked communication as a "community" [4, p. 4]. Following various network analyses, it seems that online communities have similar structural characteristics. In fact, the very term 'network' has come to signify an amorphous, transient and fluid social construction [5]. Elements such as values, beliefs, meaning, and motivation, which are crucial for community formation and integration, are either treated as confounding variables or as dependent on structure [4, p. 7]. Therefore, we suppose that virtual or online communities must somehow live up to the accomplishments of the real ones at least partially.

2. Communitarian concept of a (real) community

Nowadays communities (as Communitarians define them) are typical for a number of elements of heterogeneity. They are more diverse, adaptable and promote individual freedom and responsibility in the context of obligations to the group. Current communities are in continual active contacts with the outside world and their values are accessible to all. They try to constantly present and emphasize the common culture, and consciously promote the values and standards that maintain their integrity. In this sense they can be defined as certain "webs of social relations that encompass shared meanings and above all shared values" [6, p. 24] and at the same time

* **Jarmila Jurova**
Department of Journalism, Faculty of Arts, Constantine the Philosopher University, Nitra, Slovakia
E-mail: jjurova@ukf.sk

as "complex wholes that guide individual activity and sustain identity" [7, p. 175]. Hence, a group can be understood as community provided that it embraces a wide range of interests and activities that take the person as a whole into account, and that there exist certain common responsibilities and common culture within it. People share set of values and obligations which are based on the interdependence and the consciousness of common identity.

According to Etzioni community has specific features: "First, communities provide bonds of affection that turn groups of people into social entities resembling extended families. Second, they transmit a shared moral culture (a set of shared social meanings and values that characterize what the community considers virtuous versus unacceptable behaviour) from generation to generation, as well as reformulating this moral framework day by day" [8, p. 15]. Communities are therefore not only aggregates of persons acting as free players, but also units that have their own identity and purpose and can act as separate units and wholes. Another notable feature of the community from Etzioni´s point of view is the "relatively high level of sensitivity" [9, p. 5]. It means that the real community is not considered a social unit that oppresses their members and responds to their false needs. As Selznick states, normal communities take account of how people actually live, and want to live, not only how we want them to live [10, 11 - 12]. In this context, communitarians appeal to the need to create interconnected networks of communities because people are the members of several communities that provide them with support on various levels and in different contexts (family, school, workplace, settlement, town, church, youth organizations, various interest groups etc.). Some of them are called "constitutive" [13, p. 103] in the life of an individual as these are the communities that constitute people as individuals in large extent. They answer the basic question *Who am I?* and in Western culture they are often related to the place in a geographical sense – communities of place [14] as well as communities of memory or psychological communities (e. g. religious communities) [15].

Community must show some degree of integrity and consistency, otherwise it is not able to act in terms of shared values and goals. Integrity of the community must not stifle its internal diversity, the possibility of internal opposition, and the possibility of creating subcommunities; but it should rather promote a philosophy of pluralism. At the same time, diversity must not undermine the integrity of the community, so there must work certain institutional arrangements, agreements that reduce.

Another defining character of the community, and perhaps the most important, is a "reasonable base of shared values" [16, p. 170], which should be anchored in the form of laws and rules, but also in customs and traditions: These values should present shared vision and understanding of the common good and the future of the community and they are protected by community and its members together with the respect and active promotion of the ideals of freedom, justice, equality and human dignity.

Moreover, a good community supports climate of cooperation, requiring respect for individual differences and for the value of personal integrity. Its members must be also aware of interdependence, responsibility and the need for mutual trust. In order to establish the identity associated with certain community, active participation of community members in common tasks and the life of community is required. However, to be realistic, it would be naive to require the same level of participation from every member of community.

Healthy community constantly creates its own morals and validates its values and ideals; it has a working institutional system enabling effective communication not only within the community but also outward to other communities and to society in general. In a democratic society communities cannot be repressive, intolerant or immoral, but they must be responsive to the needs of their members and open to justified changes. In this sense "responsiveness", sensitivity or accessibility can be perceived as the cardinal feature of communities [9, p. 2-3].

3. Virtual (online) community and its comparison with a real community

It is evident that the discussions on the comparison of real (offline) and virtual (online) communities usually start with some scepticism about the question whether virtual communities match the real ones. Real and virtual communities each have their own advantages as well as their own weaknesses. From the communitarian perspective described above we will investigate what real communities can do that virtual communities cannot, and vice versa.

We suppose that virtual communities are "communities" first and "virtual" second. The technological development and the Internet have influenced the ways of communication in many spheres [17, p. 34]. Moreover, IT initiates the development of professional and scientific communities which enable new possibilities of research, alternative outcomes and wider public discussion [18]. As Evans claims the space the Internet provides is both private and communal [19], so people can sustain intimate, personal encounters as well as open, accessible forums. Individuals can learn about each other and community can flourish, and, it definitely plays an important role in the way we construct our most meaningful interpersonal relationships today. We also suggest that the main purpose of real as well as virtual communities nowadays is basically the same – it is communication and interaction

creating lasting relationship between people and allowing them to follow a shared set of values.

But in what way does the communication in virtual communities differ from the communication in real communities? Members of virtual communities do not necessarily live in the same region, so they do not meet or use face-to-face communication. However, they still can develop close relationships thanks to the communication via modern technologies. Moreover, as virtual community does not necessarily require such a personal communication because people do not have to see each other, they may even feel more self-confident while meeting new people, which is obviously helpful for future communication in real communities. Via virtual communities, people can bond without being in close proximity either spatially or temporarily, so communities can evolve even across national borders and time zones [20, p. 295]. They can encompass individuals who are homebound because of illness, age, or handicap, so as a result, for some people it is even easier to be a member of a virtual community than of a real community.

While from the communitarian point of view the concept of real community embodies the idea that human beings are fundamentally related to each other as 'whole persons' through social bonds [9] and value consensus that enable stable relationships among the members [10], individuals interacting online are often loosely linked by specialized instrumental ties and the boundaries of virtual communities are fluid and association among members ephemeral [21]. Virtual communities seem to be simply fluid aggregates of such networked individuals. Individualist attributes of the virtual community, such as voluntary association based on needs, clearly distinguish it from real communities with inherent normative structures nurturing organic orders [11]. According to Fernback [2, p. 49] "members of virtual communities speak of mutual respect and caring but demur at the notion of true closeness of the members". As Yuan [4] suggests, the metaphor of "community" in cyberspace is one of convenient togetherness without real responsibility. Hence, the concept of virtual community has become increasingly diluted as it evolves into a pastiche of elements that ostensibly "signify" community.

However, there are obviously certain differences between people constituting real communities and people constituting virtual communities. Real communities consist of people who live in the same territory, who may be of the same race, culture and religion, while virtual communities can consist of people of different nationality, colour of skin, culture or religion. People are united in virtual communities not by the common place of living, but they are united by common interests, ideas and beliefs above all. This is what communitarians call "shared values". And, "morality and values are integral parts of human communities - they are necessarily (by definition) socially embodied, not individually based" [12, p. 104].

There is another essential difference between real and virtual communities which we could call volitional choice. This means that the membership in virtual communities is much more voluntary than in the real communities as an individual member can terminate his or her membership in the virtual community conveniently and effortlessly - often simply by ending the navigation session and never returning to the virtual community's domain. This is not always possible in the case of real communities.

Some more advantages of virtual communities can be also identified. One of them is that online discussion groups or forums can accommodate many more individuals than off-line meeting rooms can accommodate [20, p. 295]. Another advantage is that people can explore new relationships or even new identities online as they are not constrained by their physical appearance or off-line identity [20, p. 295]. The Internet as a new social space liberates people from social norms and enables them to cycle through identities for self-exploration and expression [22]. Online groups are often constructed in a way that allows high visibility of relational clues and mutual relationship monitoring.

New Communitarians suggest that virtual communities are really able to form their own norms and enable strong relationships among their members, which often supplement interaction of people in real communities [23]. And, what is more, they usually have developed moral norms, such as principles of generalized reciprocity and assistance: "Even in contexts of anonymity, which hinders social controls, virtual communities have developed tools that help enforce social norms. Informal social control by social exclusion is practiced to limit "flaming", the practice of posting or sending insults or inflammatory messages on the Internet" [24, p. 391]. Another aspect of virtual communities is often mentioned when compared to real communities – anonymity. In certain sense it can be understood as a form of privacy because it reduces visibility. Virtual forms of interaction allow the usage of alias and anonymity leads to "much more polarized, coarse, uncivil social platforms, often riddled with racist, sexist, homophobic and xenophobic expressions" [25, p. 430]. Although the communities on social webs allow the usage of "false names", whatever is written there, immediately appears on the hundreds or thousands of screens of other users [26]. On the other hand, virtual communities actually provide some of the elements of "real" communities such as the informal social controls limiting e. g. the role of the state, enabling peer governance to prevent disruptive behavior on the Internet, regarding when and who to connect with etc. However, in this virtual realm these controls also require visibility and hence limit users' privacy. Etzioni [25, p. 427] also suggests that

such controls work best when people's identities online are connected to their offline identities (e.g. Facebook).

4. Common features of real and virtual communities

Karen Evans´ study aims at various aspects of real and virtual communities that we consider relevant in the search for their common features and possible matches [19].

As mentioned above, responsiveness is one of the most important characteristics of communitarian understanding of community. Responsiveness to the needs of community members includes requirements such as openness, accessibility, effectivity, democratic principles etc.

Considering the question of openness and accessibility of virtual communities, Internet services are free or at least affordable in public places nowadays, however, this does not necessarily mean that everybody can or wants to use the access to cyberspace. There can be various barriers of potential members of virtual community due to language, technical skills or technology available. So the users must be motivated and able to find and enter the community that can be beneficial and useful for them.

Wellman [19] claims that people who find each other and converse on the Internet will engage in encounters which are more focused than those which take place in the physical world. They engage only in the communities of their real interest, so the conversation is meaningful and may be more effective and rewarding. In real communities (of place, psychological etc.) the contact is often unplanned and chaotic, which can be not desirable. On the other hand, in real life one contact can bring more benefits and may be more effective.

Taking democratic principles into consideration, it must be noticed that virtual communities are not controlled by one power and they are open to "new forms of social participation" [19] as well as to diverse ways of thinking, so they break any system of autocratic system management or any hierarchical order. What is more, they allow direct contact and communication between individuals without any mediating tools, which makes the virtual community democratic.

This is connected with the requirement of liberation within community. Virtual communities, as Wellman [19] argues, allow their members great freedom in the sense of making connection (as they are only limited by the access to the Internet or other technology) as well as great freedom of action (because they disengage people from the often rigid roles which are associated with ideas of household, neighbourhood, region or nation). However, we suggest that social relationships which have forged through this medium will prove to be fundamentally different from those which have not.

5. Conclusion

To conclude, it is evident that the "virtual world" is a different place from the real world. On the other hand, virtual communities as alternative spaces are definitely becoming as important to Internet users as their real-world communities. As the virtual world is taking power over the offline world, more and more people are connecting online, joining community that better understand them, sharing the same interest (MySpace, LinkedIn, online games etc.). Undoubtedly, there are many differences between virtual world and real life and between communication in virtual communities and real communities, but "the feeling and emotion are the same" [20]. We will probably have to get used to the idea that the word community is going to have to stretch to include groups of people who communicate socially and work cooperatively and never meet in the real world. It seems that real communities are better than virtual communities in communicating affect, identifying participants and holding them accountable, and in providing group feedback. However, virtual communities have many advantages as well. The good combination of virtual and real communities is probably able to overcome the weaknesses of each and combine many of the strengths of both.

References

[1] BAKARDJIEVA, M.: Virtual Togetherness: An Everyday-life Perspective. *Media, Culture and Society,* vol. 25, No. 3, 2003, 29-313. ISSN 0163-4437.

[2] FERNBACK, J.: Beyond the Diluted Community Concept: A Symbolic Interactionist Perspective on Online Social Relations. *New Media & Society,* vol. 9, No. 1, 2007, 49-69. ISSN 1461-4448.

[3] POSTILL, P.: Localizing the Internet beyond Communities and Networks. *New Media & Society*, vol. 10, No. 3, 2008, 413-43. ISSN 1461-4448.

[4] YUAN, E. J.: Community in Modern Societies: A Critique of "Online Community" in New Media Studies. *New Media & Society*, vol. 15, No. 5, 2013, 1-32. ISSN 1461-4448.

[5] WITTEL, A.: Toward a Network Sociality. *Theory, Culture & Society,* vol. 18, No. 6, 2001, 51-76. ISSN 0263-2764.
[6] ETZIONI, A.: *Old Chestnuts and New Spurs.* A. Etzioni (ed.): New Communitarian Thinking. Persons, Virtues, Institutions, and Communities. Charlottesville and London: University Press of Virginia, 1995, 16-34. ISBN 9780813915647.
[7] SULLIVAN, M. W.: *Institutions as the Infrastructure of Democracy.* A. Etzioni (ed.): New Communitarian Thinking. Persons, Virtues, Institutions, and Communities. Charlottesville and London: University Press of Virginia, 1995, 170-180. ISBN 9780813915647.
[8] ETZIONI, A.: *The Third Way to a Good Society.* London: Demos, 2000. ISBN 1-84180-030-9.
[9] ETZIONI, A.: The Responsive Community: A Communitarian Perspective. *American Sociological Review*, vol. 61, No. 1, 1996, 1-11. ISSN 0003-1224. Etzioni here states particular conditions of responsiveness.
[10] SELZNICK, P.: *The Communitarian Persuasion.* Washington, D. C.: Woodrow Wilson Center Press, 2002. ISBN 1-930365-06-3.
[11] KATZ, J. E., RICE, R. E, ACORD, S. et al.: *Personal Mediated Communication and The Concept of Community in Theory and Practice.* Kalbfleisch, P. (ed.): Communication Yearbook 28. Mahwah, NJ : Erlbaum, 2004, 315-371. ISBN 9781135608804.
[12] VALCO, M., KRALIK, R., BARETT, L.: Moral Implications of Augustine´s Philosophical and Spiritual Journey in his Confessions. *Communications - Scientific Letters of the University of Zilina*, vol. 17, No. 2, 2015, 103-108. ISSN 1335-4205.
[13] BELL, D.: *Communitarianism and its Critics.* Oxford: Clarendon Press, 1993. ISBN 0-19-827922-1.
[14] Mostly it is a place associated with home, the place where we have family, relatives, friends and neighbours. One of the examples of community of place is a town: "...a town is the space in which we are created, a space that shapes us and that is our living space..." In DEBNAR, M.: *Between an Idea and Image. Selected Chapters on Philosophy of Literature* (in Slovak), Bratislava: Ars Poetica, 2013, 129. ISBN 978-80-89283-66-8.
[15] Some authors emphasize that religious communities have the potential to "connect the dots", so to speak, to link the shattered pieces within the lives of individuals and put together (socially) the seemingly random mosaic of contradictory and competing desires and fears of human subjects into a community with a shared vision, ethos, and purpose. See e.g.: VALCOVA, K., PAVLIKOVA, M., ROUBALOVA, M.: Religious Existentialism as a Counter Measure to Moralistic Therapeutic Deism. *Communications - Scientific Letters of the University of Zilina,* vol. 18, No. 3, 2016, 98-104. ISSN 1335-4205 and KONDRLA, M., PAVLIKOVA, M.: From Formal Ethics to Existential Ethics. *European J. of Science and Theology,* vol. 12, No. 3, 2016, 101-111. ISSN 1841-0464.
[16] GARDNER, J.: *Building a Responsive Community*. A. Etzioni (ed.): Rights and the Common Good. The Communitarian Perspective, New York: St. Martin's Press, 1995, 167-178. ISBN 0-312-08968-6. For the possible set of shared values typical for current Western culture see also PALITEFKA, J.: Western Universalism in the Contemporary Worlds. *InterNaciones*, vol. 4, No. 10, 2015, 75-85. ISSN 2007-9680.
[17] HODINKOVA, D.: *The Usage of Marketing Communication Digital Tools in Social Marketing* (in Slovak). In Marketing identity 2015: Digitalny marketing & Digitalny spotrebitel: zbornik z medzinarodnej vedeckej konferencie organizovanej v Kongresovom centre SAV na Smolenickom zamku, november 2015. Trnava: UCM, 2015, 33-42. ISBN 978-80-8105-778-6.
[18] GOGORA, A.: *Digital Humanities and Philosophy - the Problem of Digital Research* (in Slovak). *World Literature Studies*, vol. 25, No. 3, 2016. ISSN 1337-9275.
[19] EVANS, K.: The Significance of Virtual Communities, [online], *The J. of Social Issues. Special Issue on 'The Futures of Community',* vol. 2, No. 1, 2004. ISSN 1474-2918 Available on the Internet: http://www.whb.co.uk/socialissues/vol2ke.htm#KarenEvans [28/08/2016].
[20] ETZIONI, A., ETZIONI, O.: Are 'Virtual' Communities Similar to or Different from 'Real' Communities? [online], *Science,* vol. 277, No. 5324, 1997. ISSN 1095-9203. Available on the Internet: https://cti09.wikispaces.com/Are+%27Virtual%27+Communities+similar+to+or+different+from+%27Real%27+Communities%3F [28/08/2016].
[21] JOHNSON, C. M.: A Survey of Current Research on Online Communities of Practice. *The Internet and Higher Education*, vol. 4, No. 1, 2001, 45-60. ISSN: 1096-7516.
[22] TURKLE, S.: Cyberspace and Identity. *Contemporary Sociology,* vol. 28, No. 6, 1999, 643- 648. ISSN 00943061.
[23] ETZIONI, A., ETZIONI, O.: Face-to-Face and Computer-Mediated Communities. A Comparative Analysis. *The Information Society*, vol. 15, No. 4, 1999, 241-248. ISSN 0197-2243.
[24] WALL, D. S., WILLIAMS, M.: Policing Diversity in Virtual Communities. *Criminology & Criminal Justice*, vol. 7, No. 4, 2007, 391-415. ISSN 17488958.
[25] ETZIONI, A.: A Liberal Communitarian Conception of Privacy. *J. Marshall J. of Computer & Information Law*, vol. 29, No. 3, 2012, 419-461. ISSN 1078-4128.
[26] DEBNAR, M.: The Disappearance of the Author and Meaning Making (in Slovak). *World Literature Studies*, vol. 25, No. 3, 2016, ISSN 1337-9275.

Peter Kondrla - Primoz Repar*

ONTOLOGICAL CONSEQUENCES OF THE ETHICS OF TECHNOLOGY

Development of new technologies is accompanied by a necessary ethical reflection of them. This ethical reflection, for the sake of the legitimization of its own discourse, defines the relations between the fundamental ontological categories such as human, culture, nature, technology and product. Ontological interpretation of these relations is bound to the specific model of rationality. This study compares two types of rationality for the interpretation of the relations between the concepts of man, nature, and the culture of technological developments and formulates the ontological consequences of both approaches. The first approach is the theory of Arne Naes, who in his theory departs from an anthropocentric starting point for understanding the relation between man and nature, preferring instead an understanding of the biosphere as a bearer of moral values [1]. The bearer of values is not in the human consciousness which makes the evaluation of objects and nature but the bearer is in the ecosystem and its autonomous existence. Bruno Latour, on the contrary, includes in the complexity of being not only human beings but also the products of technological processes, calling them hybrids or quasi-objects. The nature and quasi-object together constitute a sphere of transcendence. A comparison of the two approaches is focused on the definition of transcendence as a potential bearer of values, meanings and moral responsibility. We compare both approaches and evaluate the possibility of their use in the development of new concepts in ethics of technology.

Keywords: *Ontology, ethics, technology, transcendence, responsibility.*

1. Introduction

The aim of this paper is to examine the relationship between moral decision making of the human subject and the ontological model that one applies to (or rather, imposes on) reality. We wish to critically observe which objects we consider as bearers of moral value and how we verify their capacity to be such bearers. Before going to ontological consequences, we must first clarify the relation between ontology and ethics in the context of its application in the area of technologies. Ethics offers several approaches to understanding good and its interpretation. Due to different ways of understanding good, various ethics offer differing explanations of why humans do good and why they avoid evil. Our choices differ in spite of the fact that their common denominator is a pursuit of good. This is true, above all, in applied ethics. Human life as a value stands in the center of our efforts. This value, however, expresses itself differently in medical professions, in nursing, police, or in a school setting. The commonly used differentiation between general and applied ethics is fully valid here: general ethics talks about good in the sense of an autonomous object and applied ethics refers to it in terms of concrete ways of searching the good on various levels of human practice. The task of general ethics is to find a legitimizing framework in which we may justify and explain what is good and evil. In applied ethics, then, we apply this legitimizing framework into practice and determine which concrete actions are good and which are not.

Nevertheless, we are confronted with the following question: Are we able to find a common consensus in general ethics, that is, a consensus acceptable by all as an ideal of good, which we could then apply in practice? This is the desire, the wish that originated in the Enlightenment, which sought to replace the legally constitutive, universally valid and accepted role of God with the new authority of reason. Indeed, "the underlying characteristic of Enlightenment is an uncritical faith in the objectivity of human reason – in the capacity of reason (a metaphysical, transpersonal category) to explain the world and to teach the human race how to live in it" [2, p. 197]. This new authority was to have the same attributes as God. Reason, thus, was supposed to postulate universally valid rules that would be respected by all. Along

* [1]Peter Kondrla, [2]Primoz Repar
[1]Department of Religious Studies, Faculty of Arts, Constantine the Philosopher University in Nitra, Slovakia
[2]Central European Research Institute of Soren Kierkegaard. Ljubljana, Slovenia
E-mail: pkondrla@ukf.sk

with Palitefka we may ask whether our contemporary Western civilization, driven by such ambitions, has any future at all [3, p. 33].

2. The question of Relativity and Plurality

The vision of modernity, originating from the Enlightenment, was a unity. This concept arises out of a conviction that there is but one universally valid truth that people across cultures and religions are able to understand and accept. For the enlightened reason, only that which can be proven, verified and ultimately proven as useful for man can be accepted as truth. This usefulness, however, ended up being reduced to an economic dimension. To prove the existence of good within the legitimizing processes of the Enlightenment was impossible. On the other hand, to measure usefulness through gain was and has remained possible, as we can witness in our everyday experience.

From its very conception, modernity has been confronted by plurality. It was held unacceptable for there to exist a different opinion which would vary from the commonly accepted one and yet be true. One common truth and one common good was the ideal of the age. The fulfillment of the ideal of truth in modernity, however, came into conflict with the freedom of the human. Freedom spawns a plurality of stances, attitudes and opinions, thereby calling into question the supposed unity of truth. This approach, in addition, often produces despair for which science has been unable to provide a solution, as Pavlíková points out [4, p. 193]. A number of authors concur that reason produced by the Enlightenment had become the cause of the biggest catastrophes of the past century. People murdered other people in the name of truth; countless victims were deprived of the freedom of thinking, expression and action.

Against the background of this historic experience, we are confronted today with an opposite extreme, the view that everything is permissible and justifiable. This phenomenon is generally linked with postmodernity. Moral choice becomes irrelevant here. There are no rules that should be followed, no authority which holds us responsible. Both of these extremes have much in common, actually, but there is one essential difference that rests in their ontological concept of reality.

The Enlightenment's concept of being results in the vision of reason as consciousness, as the only authentic being, as Heidegger (among others) was known to claim. His concept of *dasein* concentrated into the consciousness of the individual is further softened by other authors, such as Lévinas, dialogical philosophy, the so-called search for the face of the other, and the search for meaning of one's own existence in relation with the other *Thou*. Levinas' correction is the expression of being appalled by the fact how a human can look into the eyes of another human being, a suffering, tortured human – and still consider it good. The very sight of the suffering eyes should stir the inner self of the human.

For the modernity, such sight is not problematic because the other still remains a mere object, as Debnar points out [5, p. 769]. It can be so, because the Enlightenment's reason transcends all being, for it is the steward of the world and lawgiver. The whole reality is shifted to the pole of immanence. Postmodernity, on the other hand, shifts the whole reality to the pole of transcendence. Reason is not able to understand, it is not able to know and do good, hence it loses all its competences and authority. Both solutions are radical and neither of them is practically viable. The functioning of the first scenario, i.e. when reason transcends all of reality, as we have already indicated, leads to a totality by precluding free decision making and action. In the second scenario, the human individual becomes a toy in the hands of the reality – a reality which one does not understand, which one fears and where one fails to find a meaning of one's existence.

The fundamental question that arises in connection with the application of general moral categories in the concrete dimensions of practical life thus remains unchanged: Who is the bearer of moral value? To define the status of the bearer of moral value is decisively important because in order for us to be able to determine who is responsible of any given action and to whom one is responsible. We may perceive this responsibility from two perspectives. The first one revolves around one's responsibility to someone, i.e. an authority which sets the norms. The second perspective focuses on the object of responsibility, that is, who or what are we responsible for. To be accountable to someone means to accept his (her) authority as a norm-giver and to respect his model of differentiation between good and evil. In the case of religious ethics, God is this norm-giver, guaranteeing by his transcendence the correct differentiation between good and evil. However, as we pointed out before, reason, too, strives to transcend reality and offer definite solutions to the question of what is good and what is evil. A peculiar dialectic relationship of reason to itself emerges here. Reason is the norm-giver, while simultaneously being the one who subordinates itself to the norm. Transcendence thus overlaps with immanence.

3. Between Reason and Irrationality

The rise and fall of reason from the time of the Enlightenment to the present has been accompanied by attempts at a correction and a new definition of the significance and the role of reason. Especially in the 19th century, several philosophical schools emerge which try to reduce the significance of rationality at the expense of "irrationally" defined principles of being. Voluntarism or the philosophy of values might be mentioned as good examples. Volition dominates the former one, while a discerning feeling rules the latter one. Both stand in a radical opposition to rational principles of formal logic and the economics that is often associated with it. That, which brings profit, is logically good and that, which brings loss, is evil. Helping one's neighbor, taking care

of the sick, self-sacrifice – all of these are actions that produce loss. The weak has to die to allow the strong to grow. That, which is weaker, is colonized and subjected to the stronger (i.e. reason), being obliged to serve and obey its dictate [6].

The Danish existentialist, Soren Kierkegaard, belonged among the most vocal critics of this paradigm. His criticism targeted the simplified logic of formalism, namely the formalism in ethics and in religious faith. As Kralik and Torok point out, the human individual is constantly being tossed back and forth in one's restless search for new experiences, plunging into the stream of mass society where one loses one's subjectivity [7, p. 67]. Kierkegaard brings to our attention an interesting, paradoxical consequence of applying reason as it is defined by the Enlightenment. He talks about the mortification of live faith that originally consisted of an immediate, live relationship of the human individual with God. The critique of formalism is closely related to the critique of large, rationalistic conceptions, including the Hegelian system of the Absolute Spirit. It is precisely this model of thinking which so clearly represents the absolute rule of rationality, from which there is no escape. Even freedom subordinates itself to reason and law. This approach subordinates human individuals to the dictate of the society, in Hegel's case to the dictate of the state. Kierkegaard draws a parallel to the case of religion. Formalism binds the believer into a system, subjecting one to the rules and commands of the system, while failing to provide meaning to his unique existence. In the words of Kralik and Torok, priests do not proclaim God's truth but rather their own truth [8, p. 50].

Kierkegaard sees the individual as a maker of the meaning of his own existence, whereby the human is connected to the source which leads one through despair and often also acute suffering to an understanding of one's own existence. Even though Kierkegaard does not aspire to become a critic of science or that of an applied ethicist, he offers a way, as seen from the perspective of ontology, which is essentially different from the way that had been set before him by Hegel and those following his methodology. The relationship between a subject and an object is highly problematic for Kierkegaard. It limits human individuals in their possibilities of immediate search for the meaning of their own existence. This relationship between a subject and an object, at the same time, indicates an asymmetric position in which the subject observes and determines rules, whereas the object is subjected to observation, categorization, and manipulation. Kierkegaard points out that the relationship of subject and object brought to the front the question of truth that had become the source of power, rule over and control of the objects. At the same time, the categories of good and evil slowly disappear from the focus of the intellectuals. Morality steps back into the background and leaves space for gnoseology. Gnoseology, however, is not a path for searching the truth that would set humans free. Instead, it is a search for truth which might place another human individual in the position of an object and enslave him.

This is precisely what has become a source of problems for the modern thinking and the application of reason as a tool of knowledge that transcends over the reality and which decides its fate. If humans, on account of their being smarter (i.e., more reasonable), claim transcendence over nature and other living things, then this notion of transcendence will lead them to an ecological crisis that we witness today. If one, in the name of any truth, claims transcendence over other people, then resulting from such notion of transcendence are human catastrophes, world wars, conflicts, refuges etc. There is an absence, in both cases, of responsibility, not only on the individual level but also on the social level, as Jurová argues in her recent study [9, p. 71]. What Kierkegaard indicated already in the 19th century, came to the forefront of philosophical and ethical discourses of the 20th century. Their solutions usually revolved around trying to redefine the 'subject – object' relationship, as well as around a new understanding of what we consider to be reality [10].

4. The new ontology of 'Deep Ecology'

In addition to the failures of the supposedly 'naked rationality' of modernity, we have presented a summary of an astute criticism from the side of postmodernity, pointing out that reason did not manage to prevent catastrophes from happening. Instead, reason posited itself into the position of a ruler over life and what it means to be human. Not only reality but also human dignity became immanent. It became an object of interpretations from the position of rationality.

This is where a key question arises, the question of relationship between subject and object. To what extent may we leave an open space for interpretation and can be interpreted and defined by reason? Applied ethics in relation to new technologies is always confronted with the question: on what basis can we determine the limits of reason? On one hand, we have given up on the ability of reason to create a meaning of being; on the other hand, thanks to new technologies, we have reached deep inside some of the most mysterious realms of human life. Crucial in this context seems to be the question: 'who is the bearer of moral value?'. Is it the human being? If so, then we need to ask, who is a human being, when does one's life begin and when could it be said that one's life has ended? Can we, at least in a certain sense, speak of animals as bearers of moral value? Better yet, do the machines and the products of our intelligence and wisdom belong to the sphere of moral value bearers? Answers to these questions are closely linked to our particular ontological perspective.

We wish to present the holistic concept propounded by A. Naess. In his concept, Naess places the ontological dimension of the bearer of moral value on all living things, with which we co-create together a living organism and in which all of us share a mutual responsibility for the state of the living environment and the planet. Also resulting from this organic reality, is our

responsibility to take care of our environment. Due to our abilities and possibilities, we find ourselves in a position where we must not do otherwise but to assume this responsibility. Jurová, in this connection, points out the model of the so-called tolerant society, where subjectivity is transferred from the individual to a society that is open to dialogue and that is able, in this dialogical environment, to search for solutions to its problems [11, p. 144]. Such tolerance, however, is yet again based on rationality.

A new movement of the so-called 'deep ecology' develops within the environmental ethics in connection with Naess' emphases, perceiving humans as integral part of nature (and vice versa). From the viewpoint of ontology, such approach is in contrast to the modern 'subject-object' dichotomy. Such relation between subject and object constitutes an imbalance in nature because the object becomes a mere 'object of scrutiny', subject to manipulation. The subject, on the other hand, rules and decides about the value attributed to the given object, as well as how the object would be utilized in the system. The 'deep ecology' approach responds to the ensuing abuses that are engendered by this system. In addition, our current ecological situation is a stark reminder of the inadequacy of the old, dichotomist thinking. Instead of its nurturing function, our living environment confronts us with acute threats. According to deep ecology, nature has its own intrinsic value, which cannot be derived from its usefulness to humans. The critique of anthropocentrism from the side of postmodernity is in line with the critique propounded by deep ecology. The artificial dualisms between subject and object, culture and nature, reason and non-consciousness (etc.) has proved itself to be untenable. The rational, self-aware subject loses its ability to transcend reality. Deep ecology, contrary to that, draws the isolated subject into a holistic being. The process of returning the human individual as a subject into the complexity of being happens by means of forsaking the rationalistic, dictatorial positions, assuming instead irrational positions, in the context of which, due to empathy, we are finally able to identify with nature and the planet (perceived as a holistic being) as its integral part. We see a similar line of argument in Antošová who comes up with the notion of a 'transcendent concept of love' [12, p. 137]. Human being is not the measure of all things, quite on the contrary, the value of humans is measured by their presence in all things.

From the perspective of the interpretation of being, the human is unique only in the sense that one is able to become aware of one's moral responsibility for the whole. This realization, however, is not strictly rational; it is not a realization in terms of a rational calculation that if we continue to devastate nature, destroyed environment will become a threat to our own existence. This awareness is rather our empathizing with nature, while realizing our own partaking in a complex organism, in being itself, in Naess' sense.

In practical life, this kind of thinking has inspired countless activities of nature protection, though its application in the ethics of research remains complicated due to the ontological consequences that we pointed out before.

5. The Metaphysics of Networks

Latour, similar to Naess, strives to include a wider array of being in his concept of reality (besides the self-aware human being). In his concept of post-structuralist motivated theory of network agents, however, Latour surpasses the boundaries of biosphere. We may accept, along with Gogora, the term *oligoptikon*, which relatively accurately captures this shift [13, p. 489]. Latour searches for a solution that remained hidden from the modernity or, we should better say, he is trying to bring modernity to its real goal for, according to Latour, we have never been modern. However, he rejects being identified as a postmodern thinker, suggesting instead the term 'amodernity', which better encapsulates his ontological stance. Latour carefully examines the methodology and art in which modern science develops, arguing that scientist actually do not describe reality but rather construct a cosmological model the task of which is to verify all further evidence and claims. This, obviously, leads to separating human society from nature. Science goes even as far as to decide about truth and untruth in the process of knowing nature, as Latour's example pertaining to vacuum clearly shows.

Latour thus defines a new starting point that accepts two kinds of transcendence. The first one is the transcendence of nature and the second one is the transcendence of society. Contrary to previous claims, we encounter new types of transcendence here. The dualism of two transcendences, however, will incessantly engender a conflict and tension. Hence we will actually never move beyond the limits of modernity the paradigm of which we wished to forsake. Latour strives to remove the contradiction and conflict by means of a combination of both types of transcendence, using the process of redefining and re-purifying the so-called 'quasi-objects'. The purification of quasi-objects is a method that will enable us to comprehend the fact that just as society produces culture and objects, so also nature limits society and its possibilities of existence. It is not possible to find a univocal, conclusive answer to the question: 'what is on the side of the object and what is on the side of the subject?'. Therefore, he talks about 'quasi-objects' that are in a certain sense objects, while in another sense also subjects [14].

This ontological shift ultimately means that if we want to understand the moral dimension of our actions and the corresponding moral applications in science, we must neither assess them from an extreme, one-sided position of the creators of technologies, nor from the opposite extreme position of those who are threatened by these technologies. In this case, the ontological shift means that we must accept not only all living things but also all technical objects that we have created into the complexity of our responsibility. After all, we are already

beginning to encounter the question of intelligent machines that are relatively autonomous in making choices, which raises the question of assuming responsibility for their decision making.

6. Conclusion

Our striving to solve the questions that originated as a result of technological advancement but also due to the intentional application of a dominant position of the Enlightenment's reason requires a change in our ontological interpretation of reality. The bipolarity of the world that has been an integral part of the foundations of our civilizational paradigm separates reality into subjects and objects, true and untrue, real and non-real. We have shown that our ontological position (view) should move to the middle, which ultimately means that we should forsake the superior position of the knowing subject and leave some space for doubt, including the possibility that we might actually be wrong. As Valco and Valcova point out, "The neglect of the subject and his inner world results in ambitious projects of human ideologies at the expense of the individual. The proud pursuit of objectivity without a recognition of human limitations, and the dimension of subjectivity in the process, has proved to be a dead end that emits the stench of manipulation, loss of human dignity, and finally nihilism" [15, p. 26]. We should rather embrace that the human does not intrinsically surpass reality through one's individuality or subjectivity, but is rather a member of an ontologically higher whole, i.e. the society or biosphere. Hence, an adequate point of departure (for Latour as well as for Naess) appears to be the forsaking of egoism that was originally constituted by the Enlightenment's subject. Although the shift from the position of 'I' to the position of 'we' is, in Latour, determined by his sociological approach, it brings similar results to those stemming from Naess' concept.

At the same time, we need to be aware of the danger that Kierkegaard warns about. Both, the holistic as well as the structuralist approaches significantly complicate one's personal relationship with God or, more generally, to transcendence, which is the basis for the individual' authentic experience of one's existence. In both cases, existence is either evaluated based on its participation in society, as defined by its position in the structure of the given society, or it is interpreted as a partial member of an organism, as an organ that functions in the context of biosphere as a whole. In both cases, thus, the situation amounts to a rejection of the ancient and Christian traditions which understood the human as a rational living entity whose essence was constituted by the unity of its body and soul. Human rationality meant, among other things, that humans were able to distinguish between good and evil and to make choices for the benefit of the good.

In the Enlightenment, however, rationality assumed a new dimension (to the detriment of the social and living environments). After its historic failure in the wars and concentration camps of the 20th century, the only viable solution seemed to be to give up on the subject (as an individual) and to transfer the agency of the bearer of moral value onto the society, onto a collective consciousness, or a structure of objects and events that constitute moral meaning and value. After all, as Valco, Kralik and Barrett argue in their recent study, morality and values are an integral part of human society – they are "socially embodied, not individually based" [16, p. 104]. It remains to be seen, however, whether the set of possible solutions might also include a return to the original ideal of a virtuous, rational living being, with the conviction that "central to living a happy life is being a good, moral person" [17, p. 98]. This return would, in any case, require a personal, inner conversion, instead of legalism. It would require an intentional, personal stance, perhaps even the inner disposition of a hero, not the cowardly transfer of responsibility onto the society or our life circumstances. This question concerns science and the implementation of ethics in science. As long as a scientist functions only by the rules, often even violating them, this is a legalistic approach which indicates that the scientist is not that rational living being who distinguishes between good and evil. He is rather a scholar of the Enlightenment type, aspiring at all costs to increase the limits of knowledge and to penetrate deeper into the essence of things, cells, objects with the desire to rule over them (i.e., use them to one's own benefit). Nevertheless, the principle stays valid: he who wishes to govern others, must first manage to rule (control) himself. A good initial step might be, if general and applied ethics were not perceived as a useless waste of academic credits in educating future scientists but rather as a legitimate part of the development of personality of the future scientist. This might set us on the path of searching "for elements that might be utilized in building up a synthetic philosophical outlook on the reality of this world - an outlook that would not only map this reality but would also designate in it the necessary reference points adequate for human conduct and interaction" [18, p. 209].

References

[1] NAES, A.: *Ecology, Community and Lifestyle: Outline of an Ecosophy.* Cambridge University Press, 1993, p. 187. ISBN 978-0521348737.

[2] VALCO, M.: Alternative Viewpoint: Edwards and the World Religions. In G. McDermott (ed.), *Understanding Jonathan Edwards, An Introduction to America's Theologian.* Oxford, Oxford Univ. Press, 2009, 195-200.

[3] PALITEFKA, J.: The Future of Western Civilization in the Context of Oswald Spengler's Work. *European J. of Science and Theology*, vol. 12, No. 3, 2016, 33-43. ISSN 1841-0464. For more about the relationship between science and theology, see: HANES, P. & MASARIK, M.: Complementarity of Science and Theology. *European J. of Science and Theology,* vol. 12, No. 6, 2016, 5-20. ISSN 1841-0464.

[4] PAVLIKOVA, M.: Despair and Alienation of Modern Man in Society. *European J. of Science and the Theology,* vol. 11, No. 3, 2015, 191-200. ISSN 1841-0464.

[5] DEBNAR, M.: *Subjectivity in Writing from Ferdinand de Saussure to Paul de Man*. vol. 1, Sofia: SGEM, 2016, 769-775. ISBN 978-619-7105-52-0; also see: DEBNAR, M.: *The Disappearance of the Author and Meaning Making* (in Slovak), *World Literature Studies*, vol. 25, No. 3, 2016, 104-121. ISSN 1337-9690.

[6] As an anti-dote against this radical claim on truth, Diatka and Ligus propose a positively oriented skepticism that is not destructive but constructive. See: DIATKA, C., LIGUS, J.: Thinking about Certainty and tolerance with Michel Eyquem de Montaigne. *Communications - Scientific Letters of the University of Zilina*, vol. 18, No. 4, 2016, pp. 123-128. ISSN 1335-4205.

[7] KRALIK, R., TOROK, L.: Concept of Relationship God-Man in Kierkegaard's Writing 'What We Learn from the Lilies in the Field and from the Birds in the Air'. *European J. of Science and Theology,* vol. 12, No. 2, 2016, 65-74. ISSN 1841-0464.

[8] KRALIK, R., TOROK, L.: The Moment' Kierkegaard's Attack upon Christendom. *European Journal of Science and Theology,* vol. 12, No. 3, 2016, 45-53. ISSN 1841-0464.

[9] JUROVA, J.: On Etzioni's Concept of a Responsive Community. *European J. of Science and Theology,* vol. 12, No. 3, 2016, 71-80. ISSN 1841-0464.

[10] PAVLIKOVA, M.: The Concept of Anxiety and its Reflection in Auden's Work 'The Age of Anxiety'. *European J. of Science and Theology,* vol. 12, No. 4, 2016, 111-119. ISSN 1841-0464.

[11] JUROVA, J.: Ethical Aspects of Toleration from Liberal Perspective. *European J. of Science and Theology,* vol. 12, No. 1, 2016, 139-145. ISSN 1841-0464.

[12] ANTOSOVA, M.: Axiological Scope of Dominik Tatarka's Texts (Philosophy of Love) *European J. of Science and Theology,* vol. 12, No. 1, 2016, 129-137. ISSN 1841-0464.

[13] GOGORA, A.: Latour a Sartre v Cafe de Flore (Latour and Sartre in Cafe de Flore). *Filozofia,* vol. 67, No. 6, 2012, 485 - 490. ISSN 0046-385 X.

[14] LATOUR, B.: *We Have Never Been Modern*. Harvard University Press, 1993. ISBN 0-674-94839-4.

[15] VALCO, M., VALCOVA, K.: *Communications - Scientific Letters of the University of Zillion*, vol. 16, No. 3, 2014, 25-28. ISSN 1335-4205.

[16] VALCO, M., KRALIK, R., BARRET, L.: Moral Implications of Augustine's Philosophical and Spiritual Journey in His Confessions. *Communications - Scientific Letters of the University of Zillion*, vol. 17, No. 2, 2015, 103-108. ISSN 1335-4205.

[17] VALCOVA, K., PAVLIKOVA, M., ROUBALOVA, M.: Religious Existentialism as a Countermeasure to Moralistic Therapeutic Deism. *Communications - Scientific Letters of the University of Zilina*, vol. 18, No. 3, 2016, 98-104. ISSN 1335-4205.

[18] HAJKO, D.: Wilmon Henry Sheldon and his "Synthesis of Philosophies" (in Slovak), *Filozofia,* vol. 71, No. 3, 2016, 209-219. ISSN 0046-385 X.

Roman Kralik - Susanne Jakobsen Tinley*

KIERKEGAARD'S ETHICS AS AN ANSWER TO HUMAN ALIENATION IN TECHNOCRATIC SOCIETY

Kierkegaard is well-known for his noting tendencies of the present age which point in the direction of alienation. Tracking the course of Danish society's moral trajectory Kierkegaard considers recent developments in the direction of the outward, the superficiality of a mindset that craves entertainment and the latest fad. This hunger for entertainment, epitomized by the technical marvels of Tivoli, leaves man on the outside, a spectator unable to make important decisions. Whereas Kierkegaard's emphasis on the individual encountered in the critique of 'the crowd' can, and has been seen as an indirect critique of democracy (echoing Plato's objections) it is a concern with any potential threat to the integrity of the individual. Considering Kierkegaard in relation to other dominant voices of his time we find that he is concerned not only with the pastimes of his fellow citizens but more precisely with the lack of an overall idea of the true nature of human existence, a deficiency leaving them prey to technocratic encroachments.

Keywords: *Kierkegaard, Technocratic Society, Alienation, Human Being.*

1. Kierkegaard and 1900 century Danish society

It seems appropriate to ask why - if at all - Kierkegaard's words of concern regarding Danish society two centuries ago are still of interest to us today. If we were to try to sketch an ethics as such based on his warnings as well as the proposed solutions, what would it look like and in what ways would it be valid to hear in his words a forewarning of times to come? A thinker of enduring relevance, Kierkegaard detects in his time certain unfortunate tendencies and is able to relate these to central insights into human nature as such. A thinker ahead of his time he anticipates the corrosive effects of nihilism, and inspires later psychology i.e. in the case of Freud, depth psychology and our awareness of the subconscious. Central to his influence on later thinkers is his concern with the human self: how we human beings relate ourselves to the surrounding world and, vitally, how we relate to ourselves.

How this connects with the topic of this article will become clear when we consider to what extent the concern with the human self must be seen as the point of departure for Kierkegaard's critique of the tendency of certain technological developments of his time. Tendencies, which as it turns out play an even more dramatic role in our day [1]. But let us first turn to the sense of the importance of the role played by communication which seems to both underpin his critique and spell out part of a solution.

The dangers of communication

Considering Kierkegaard's apprehension with regard to the status of his 'present age' we find that it is specifically the status of the individual that concerns him. Certain developments within nineteenth century Danish society he sees as detrimental to the development of the individual. Kierkegaard comments on the general technical advances including the bustle of Tivoli where everyone is on display. Other Danish key figures of the time do so too, thus poet, playwright and literary critic, Heiberg, warns against the spectacular amusement park, seeing its success as a "failure of the contemporary public" [2, p. 22]. However, there are dangers graver than Tivoli. According to Kierkegaard, the individual is under pressure. Much of this pressure is due to developments in terms of the press. The inordinate amount of power wielded by those in charge of particularly one of the papers in Copenhagen at the time, Kierkegaard himself experienced personally in an attack which he to some extent brought upon himself when he chose to pick a fight with the satirical paper 'The Corsair' (Corsaren). The so-called 'Corsair affair' refers to a period, 1845-46, when Kierkegaard is ridiculed in the satirical paper. With its name taken from a French satirical paper 'Corsaren' should be seen

* [1]**Roman Kralik,** [2]**Susanne Jakobsen Tinley**
[1]Central European Research Institute of Soren Kierkegaard, Constantine the Philosopher University in Nitra, Faculty of Arts, Nitra, Slovakia
[2]University of Southern Denmark, Denmark
E-mail: rkralik@ukf.sk

in that same tradition of satire originating in nineteenth century France. It was a great burden being singled out in this way and as a result to be given such excessive attention by the inhabitants of the walled 'market-town' as Kierkegaard referred to Copenhagen. The Corsair affair catapulted the Kierkegaardian authorship in an unforeseen direction, changing his intention that his latest work Concluding Unscientific Postscript would be the last from his hand. The event marks the beginning of his assault on journalism – the power of the press to decide public opinion is a real danger. Not just for the individual singled out for ridicule but in a more general sense it is a danger to the individual reader. "Personality has been abolished", writes Kierkegaard, and the "driving force behind impersonality: the press – and anonymity", he continues: "But the somebody who is nobody (and therefore has no responsibility) can put any error into circulation [...] and with the help of the most dreadfully disproportioned communications medium, that is terrible. And that this irresponsible error should then be taken up by the public which is again nobody! There is no one anywhere, and that is why there is error everywhere [...]" [3]. With the press then arrives the mass-audience and the resulting lack of responsibility feeds a misrelation in the form of an underdeveloped self.

The individual

What we find is that with Kierkegaard the all-important relationship to be considered is the relationship of the individual to himself. Kierkegaard has repeatedly been accused of focusing too singularly on the self-relation and thereby overlooking the relation of the individual to society. In order to understand what may appear as one-sidedness it helps to consider that for Kierkegaard and the tradition to which he can be said to belong, the endeavor to improve one's situation *begins with oneself*. He explains: "I am accused of causing young people to acquiesce in subjectivity. Maybe, for a moment. But how would it be possible to eliminate all these phantoms of objectivity such as the public, etc. except by stressing the category of the particular? Under the pretext of objectivity, the aim has been to sacrifice individualities altogether" [4]. Hence it seems the emphasis on the individual's relation to himself is appropriate when faced with the opposite tendency in society.

Kierkegaard the Socratic

Rather than attempting to sketch a Kierkegaardian ethics in a straightforward way in the terminology of contemporary ethics, considering his interest in the Greek tradition is often a good point of departure. The importance of the topic of communication seems a recurrent theme in both the self-understanding of this 'Socrates of Copenhagen' and in his critique of his age. Thus, the solution to the creation of mass-man appears to be the singling out of the individual.

Clearly the example of Socrates played a major role throughout Kierkegaard's authorship. The level of commitment becomes evident in his insistence on being accessible to his fellow Copenhageners, meeting them in the streets striking up conversations with individuals of all backgrounds. However, just as at the time of Socrates, Copenhagen society at large is not keen to see themselves and their ideals for what they really are. In a city where the prevailing mood, according to Kierkegaard, is one of fear and envy, his visibility as an effect of the Corsair affair changes the way he is able to interact with his fellow Copenhageners. The Socratic ideal concerns, in the words of Muench, an "awareness needed in order to avoid falling into the trap of imagining knowing more than one does, this "acute self-awareness" is what Kierkegaard seeks to provide to others [5, p. 29]. "In fact, he must himself be an accomplished master of this activity (he must uphold the Delphic injunction to know thyself) if he is to be able to help others to make similar discoveries about themselves and to introduce them into the rigors of a life that seeks to avoid that more disgraceful kind of ignorance in all its various manifestations" [5, p. 29].

The role of the author

Overall Kierkegaard's critique can be said to concern communication broadly. Related to the criticism of the press is his assessment of certain authors whose works fail live up to Kierkegaard's understanding of the role of the author. Among these was Hans Christian Andersen, the poet and author world famous for his fairytales and eight years Kierkegaard's senior. He singles out Andersen for criticism for having *no life-view* to offer his readers. It seems that Kierkegaard demands of the author that he remain true to himself even while the world around him changes. In the words of Lone Koldtoft: "It was not simply a review of the novel, but a personal attack on Andersen himself. Kierkegaard characterizes the novel's main character, Christian, as "a sniveler," "a little boy," and "a poor wretch," who is without strength of character, vain, responding only passively to the whims of his milieu." Koldtoft quotes Kierkegaard: "The same joyless battle Andersen himself fights in life now repeats itself in poetry" [6, p. 14]. To Kierkegaard there is a subtle but important difference in the author's speaking from the position of a 'life-view' as opposed to simply allowing his own personality to get in the way of the reader's understanding. However, while Kierkegaard spends much time critiquing those around him, he in turn spends even more of his time considering his own approach, concerned with the success of the method, balancing his pseudonymous with the upbuilding, Christian part of his authorship. With the author lies the power to speak in a very personal way to his reader – a task which Kierkegaard as an author surely took upon himself [7].

2. Freedom of human being

In his work, Kierkegaard strives to show how one should live. He utterly rejects any utilitarian motives on the side

of man, such as expediency, self-interest calculation, or preferential relationships, whether this be in relation to God or to one's neighbor. The same holds true for faith itself. Faith requires that one's actions are conducted with a pure heart and a desire for good. Faith itself must be interconnected with deeds. Whenever faith is detached from deeds (corresponding to faith) and/or it becomes opportunistic or driven by fear, doubts start to emerge.

In addition to wanting to act and acting on the basis of faith, man must also think on the basis of faith. Kierkegaard tries hard to lead man by means of indirect questions and examples to searching for truth. What is the motivation of man's actions? Why is he acting the way he is acting? What does he truly desire? What will be the means to the desired end?

Kierkegaard is a beautiful example to us of the fact that, on account of his wealth and comfort (derived from technology), man had ceased to experience joy in life and peace in his soul. Kierkegaard uses the following example to contrast wealth with the ability to see the stars.

When the well-to-do person is riding comfortably in his carriage on a dark but starlit night and has the lanterns lit-well, then he feels safe and fears no difficulty; he himself is carrying along the light, and it is not dark right around him. But just because he has the lanterns lit and has a strong light close by, he cannot see the stars at all. His lanterns darken the stars, which the poor peasant, who drives without lanterns, can see gloriously in the dark but starlit night. The deceived live this way in temporality: busily engaged with the necessities of life, they are either too busy to gain the extensive view, or in their prosperity and pleasant days they have, as it were, the lanterns lit, have everything around them and close to them so safe, so bright, so comfortable - but the extensive view is lacking, the extensive view, the view of the stars [8, p. 310].

So, the human being now faces an acute choice: to own, or to experience and to be. The choice to own wealth brings him stress, restlessness, a constant psychological pressure to cope with ever changing circumstances, to always be better in order to withstand the ever-increasing demands of a highly competitive environment. Resulting from the human choice to always achieve better results (and to always own more) is his loneliness [9].

Another reason for man's loneliness is that he is willing to act unethically in order to gain more wealth and/or career advancement. Achieving the set goals becomes the highest priority for humans, no matter what the costs are. Human individuals no longer care about the means that are used in achieving the desired goals. This can clearly be seen in bicycle racing with the seemingly omnipresent "technical doping'.

The athletes are by far not the only ones who have to prove their abilities under undue pressure. Quality was replaced by quantity and a desire for a quick success. Achieving one's goal assumes the highest priority. Kierkegaard writes about this situation with clarity in his work *Purity of Heart*:

And now the means that you use. What means do you use to perform your work; is the means just as important to you as the end, just exactly as important? If not, you cannot possibly will one thing; in that case the indefensible, the irresponsible, the self-serving, the heterogeneous means enters in, disturbing and defiling. Eternally understood, the means is one thing, the end is one thing, the means and the end are one and the same. There is only one end: the good in truth, and only one means: to will to use only the means that in truth is the good means- but the good in truth is indeed the end. Temporally and mundanely the two are separated and the end is considered more important than the means; the end is considered primary. It is required of the one striving that he achieve the end; he may be less scrupulous about the means. But this is not the case, and to have an end in this way is an ungodly impatience. In the eternal sense, the relation between end and means is rather the reverse. If a person sets himself an end for his striving here in life and does not achieve it, he may possibly be altogether without guilt in the eternal sense, yes, is even to be praised. After all, he can be prevented by death or by adversities that are not under his control; in that case, he is entirely without guilt. He can even be prevented from achieving the end by refusing to use means other than what is admissible according to eternity's understanding, that is, by renouncing the impatience of passion and the devices of sagacity-in that case he is even to be praised. Thus, he is not eternally responsible for achieving his end in temporality, but he is unconditionally eternally responsible for which means he uses [8, p. 141].

Human individuals living in the present, technocratic world desire to own more and to be successful at all costs. They constantly compare themselves to others, they never seem content and their only goal seems to be a comfortable, secure life filled with pleasures. The driving force of one's actions, therefore, becomes one's reward and benefit. Any self-limitations, self-renunciation, or any austerity measures are sternly rejected and maximum benefit is pursued at all costs. Kierkegaard, on the other hand, wanted to remind human individuals of the unavoidable need to understand oneself, one's own existence, including one's own weakness (and insignificance) before God. Kierkegaard did not believe that man would become better or happier on the basis of scientific or technological advances. He was rather skeptical to the fruits of technological progress which had promised to fulfill both, the social and the individual needs and expectations of people. He did not believe in institutions, progress; he had no trust in people who, after they had gained an office, they clung to it, trying to hold on to it regardless the costs because they were convinced it (the office they held) would secure them a comfortable life.

What is the situation today? With the help of science and technology, man can achieve the impossible, yet one is unable to solve one's intrapersonal and interpersonal conflicts, looming at every corner. Human beings experience more, not less anxiety and despair, striving desperately to overcome their inner suffering. The root cause that Kierkegaard saw behind this situation was the crisis of relationship between man and God. The human individual has ceased to reflect intellectually about the meaning of life and instead spends countless hours playing computer games or absorbing senseless media contents delivered by contemporary reality shows. It seems as if man had ceased to search for a meaning of one's actions, existence, even of one's own self. Human being has stopped to search for the meaning of life on Earth. These questions bring discomfort to man, they bring about an inner pain (or, perhaps, even anguish), and so one tries to push them away from one's life-horizon. The contemporary man has lost faith in good and no longer seems to enjoy the natural inclination to do good. Kierkegaard's *Purity of Heart* is thus intended to be a sobering mirror to those who live in self-deception, as well as an enticement of hope to those suffering from despair.

Kierkegaard saw the problem faced by humans living in a technocratic society, a society that allows each individual to focus only on one's own need. The aim ought to be the fulfillment of one's greater purpose. Kierkegaard therefore requires that everyone love others and help them find their way to the good. Kierkegaard thought that the problem of European Christianity as a whole was the inclination of people to subordinate everything to their own welfare and their unwillingness to suffer and to sacrifice anything for the sake of others. They forgot to follow the example of the founder of Christian ethics - Jesus Christ. The true freedom of man lies not in technocracy, but in free decision making.

3. Kierkegaard's Legacy for our Age

Relating Kierkegaard's criticism of the press of his time to our situation today we find it is even more relevant now. According to Katharine Viner, Editor.in Chief of the Guardian, it is not that nobody cares about the truth any longer. She writes in her article 'How technology disrupted the truth' that rather it is that '[s]ocial media has swallowed the truth' and how the nature of certain websites cause an entirely fictional story to climb to the top of the currently trending stories to look like an established fact. She continues: "Twenty-five years after the first website went online, it is clear that we are living through a period of dizzying transition. For 500 years after Gutenberg, the dominant form of information was the printed page [...]" a format "that encouraged readers to believe in stable and settled truths" as opposed to the situation today where we are "caught in a series of confusing battles between opposing forces: between truth and falsehood, fact and rumor [...]between an informed public and a misguided mob" [10]. For Kierkegaard, the truth of main importance was to be found in the relationship of the individual to himself, in taking responsibility for one's actions. Alienation in its 'deeper form' is in Kierkegaard's opinion, as pointed out by Malantschuk, "rooted in spiritual factors" and it requires a "change from within" [11, p. 14] if Mass-man is to avoid being influenced by external powers. Such a change would require that each man become a 'single individual' and in turn requires that those in a position to understand this take care to help others into a position to discover the same for themselves. Hence the critique of a brilliant, well-known author such as Andersen who was indeed able to influence a large audience but, in Kierkegaard's opinion failed to make use of this position.

Nowadays man experiences loneliness. One reason for this is the constant increase of his desire to own things. Man in technocratic society is not satisfied with his achievements and is under the pressure of society, in particular consumerism. Humans have become dependent on others and subordinated their relationships, thoughts and actions to the needs of modern society. Kierkegaard's ethics offers a solution. This solution lies in becoming an individual and in searching and finding selfless priorities.

4. Conclusion

Kierkegaard was able to play the role of Socrates in relation to his city. His works continue to play a role today when read and appreciated by that rare reader who is willing to take the time to first understand and then attempt to consider what they read in relation to their own life. Kierkegaard attempts to make out of his readers 'single individuals' who are able to withstand the pressure of external pressure. Perhaps, just as Kierkegaard lets his pseudonym Anti-Climacus repeatedly call out the name of his hero: "Socrates, Socrates, Socrates!" saying that what the world needs is not a republic, a new social order or a new religion, rather it "is a Socrates" – some "ironic-ethical correction" [12, p. 92], we could say today that what our modern times need might be to revisit Kierkegaard's thoughts on the importance of the single individual. Just as Socrates denies that he, the wisest man, *knows anything*, Kierkegaard denies *being a Christian* [13, p. 99]. In doing so he attempts to emphasize the efforts implied in considering oneself a Christian in a meaningful sense. His function is to hold a mirror for his time to reflect itself in so as to discover its shortcomings – a function which will probably never be met with much enthusiasm regardless of the age in question.

The problem of modern individuals is their fear of everything unknown, of uncertainty, the fear of losing what one gained.

Kierkegaard's ethics offers solutions to overcoming human alienation:

a) orientation towards one's neighbor living next to us,

b) emphasizing non-preferential love to others,
c) ceasing to focus exclusively on one's own goals and intentions, and instead being there for others, helping them to find their own way to the good,
d) willingness to accept suffering, injustice and humiliation.

Kierkegaard did not see the optimal future of mankind in the improvement of its technocratic attributes; he rather relied on human inwardness, on a passionate determination to seek a positive relationship with others and with God. Kierkegaard's ethics emphasizes human relationship and the love of neighbor. As long as the increasingly sophisticated use of technology remains mankind's highest interest, human alienation will only deepen.

References:

[1] Even if our current liberal democracies "embody the best socio-economic system and human political governance" that humanity has been able to generate, "this celebrated 'socio-political contract' moves dangerously close to the abyss of the next totalitarianism, stemming from unchecked consumerism and media manipulation," as Valco incisively points out. VALCO, M.: Rethinking the Role of Kierkegaard's 'Authentic Individual' in Liberal Capitalist Democracies Today, European J. of Science and Theology, vol. 11, No. 5, 2015, 129-139. ISSN 1841-0464.

[2] PATTISON, G.: *Poor Paris!: Kierkegaard's* Critique of the Spectacular city. Kierkegaard Studies. CAPPELORN, N. J., TOLSTRUP, C. (eds.), Berlin - New York : Walter de Gruyter, 1999. ISBN 978-3-11-176669-0.

[3] KIERKEGAARD, S.: Pap. VIII A 540. In Peter Andreas Heiberg, Victor Kuhr and Einer Torsting (eds.). *Soren Kierkegaards Papirer*. Copenhagen : Gyldendal, 1909-1948; expanded by Niels Thulstrup. Copenhagen : Gyldendal, 1968-78.

[4] KIERKEGAARD, S.: Pap. VIII A 8. In Peter Andreas Heiberg, Victor Kuhr and Einer Torsting (eds.). *Soren Kierkegaards Papirer*. Copenhagen: Gyldendal, 1909-1948; expanded by Niels Thulstrup. Copenhagen: Gyldendal, 1968-78.

[5] MUENCH, P.: Kierkegaard's Socratic Task. University of Pittsburgh. 2006. Ph.D. Dissertation. Available online: http://www.sorenkierkegaard.nl/artikelen/Engels/172.%20Muench_Kierkegaard_socratic_task.pdf.

[6] KOLDTOFT, L.: 'Hans Christian Andersen: Andersen was Just an Excuse'. Kierkegaard and his Danish Contemporaries: Literature, Drama, and Aesthetics. Stewart, Jon Bartley, (ed.), Ashgate Publishing, Ltd. 2009, 1-31. ISBN 978-0754668749.

[7] For next inspiration compare to: DEBNAR, M.: The Disappearance of the Author and Meaning Making (in Slovak), *World Literature Studies*, vol. 25, No. 3, 2016. ISSN 1337-9690.

[8] KIERKEGAARD, S.: *Upbuilding Discourses in Various Spirit.* Princeton : Princeton University Press, 1993. ISBN 0-691-03274-2.

[9] For more on this topic, see: PAVLIKOVA, M.: Despair and Alienation of Modern Man in Society. *European J. of Science and Theology,* vol. 11, No. 3, 2015, 191-200. ISSN 1841-0464; PAVLIKOVA, M.: The Concept of Anxiety and its Reflection in Auden's work 'the Age of Anxiety. *European J. of Science and Theology,* vol. 12, No. 4, 2016, 111-119. ISSN 1841-0464; JUROVA, J.: On Etzioni's Concept of a Responsive Community. *European J. of Science and Theology,* vol. 12, No. 1, 2016, 71-80. ISSN 1841-0464; KONDRLA, P.: Apophatic Theology, Philosophy of Dialogue and Communication Perspectives. *European J. of Science and Theology,* vol. 12, No. 1, 2016, 117-128. ISSN 1841-0464; STUR, M.: Responsibility and Sensus Communis at Unamuno's, Ortega y Gasset's and Heidegger's Work. *XLinguae,* vol. 4, No. 4, 2011, 30-39. ISSN 1337-8384.

[10] VINER, K.: 2016, https://www.theguardian.com/media/2016/jul/12/how-technology-disrupted-the-truth

[11] MALANTSCHUK, G.: The Controversial Kierkegaard. Waterloo : Wilfrid Laurier University Press, 1980, ISBN 0-88920-093-9.

[12] KIERKEGAARD, S.: *Sickness unto Death.* Princeton : Princeton University Press, 1980. ISBN 0-691-07247-7.

[13] Valco highlights this fact commenting on Kierkegaard's *The Sickness unto Death,* pointing out that in this work the Danish author evoked "'idealized Christianity,' with which Kierkegaard does not dare to identify himself." VALCO, M.: Kierkegaard's 'Sickness unto Death' as a Resource in our Search for Personal Authenticity. *European J. of Science and Theology,* vol. 12, No. 1, 2016, 97-105. ISSN 1841-0464.

Dasa Novacikova*

ENVIRONMENTAL ISSUES AND REFLECTION OF THEIR PERCEPTION IN INTERNET MEDIA

The purpose of this study is to determine the extent to which the media are devoted to global environmental problems and to how they measure them. The initial categorization of the published texts in reputable online media with national coverage (that also has its printed counterpart), specifies how and where the most important environmental issues are reflected in online media, more specifically in SME and Pravda. We believe that only marginal space is dedicated to the important environmental issues. The basis of the content analysis is to document the frequency and the thematic focus of the contributions dedicated to environmental topics. Within this study attempts are made to highlight the media's ability to positively influence and shape public opinion. It also aims to emphasize the importance of the media's educational character in the context of environmental themes, the publishing of which has global importance.

Keywords: *Online media, the environment, global warming, environmental issues.*

"We need the tonic of wildness...At the same time that we are earnest to explore and learn all things, we require that all things be mysterious and unexplorable, that land and sea be indefinitely wild, unsurveyed and unfathomed by us because unfathomable. We can never have enough of nature."

Henry David Thoreau, Walden; or, Life in the Woods

1. Introduction

Mass-media offers a wide range of topics – for example political, social, cultural and amongst them, those that deal with environmental issues. There are specific texts related to climate change in the context of global warming, drinking water and soil contamination, destruction of ecosystems, pollution or waste management problems. We live in an age in which the word 'globalization' becomes extremely frequent in the vocabulary of most world population. "The notion of globalization has become the leitmotif of our age" [1, p. 1]. In the debate on globalization we are constantly reminded of the compression of time and space [2 and 3], and the "intensification of consciousness of the world as a whole" [4, 5, p. 421]. The way media present events influences the perception and the decision making process of the audience [6, 7 and 8]. The importance of the art of conveying information, its transformation and subsequent implication of moral principles is highlighted in the recent study by Valco, Kralik and Barrett [9 and 10]. Similarly, Kralik and Kondrla develop this theme in their study "Authentic being and moral conscience" [11] and Butorova with Roznova point out the acute correlation of media with ethical principles [12 and 13]. The very issue of living environment is thus always situated in the context of other news, commentaries, or other media genres. The contents spectrum mainly consists of political topics. Also communicated are news about specific fields, such as education, health care, culture, economics. Environmental themes, however, remain on the fringe of media interest.

2. Fundamental global environmental issues and their effects

It is obvious that the issue of environment (its pollution and the need of its protection) has gained global significance, common concerns being identified and discussed in all parts of the planet [14, 15 and 16]. It affects all countries on the planet, including the Central European region. Prominent among the discussed problems are, for example: landscape devastation, human overpopulation, hydrologic crisis, waste accumulation, pollution of soil, water, and air, the loss of biodiversity, nuclear waste and the threat of radioactive contamination. These topics are connected with other problems that demand our careful

* **Dasa Novacikova**
Department of Journalism, Faculty of Arts, Constantine the Philosopher University, Nitra, Slovakia
E-mail: dnovacikova@ukf.sk

attention, such as climate changes the result of which is human induced global warming. R. Stahel points out that "the most serious threat within the global environmental crisis are climate changes. These constitute a more acute danger than pollution or anything else" [17]. The media are and should be the means able to inform the public about the reality of depletion of natural resources, deforestation, or the rampant diminishment of the corral barrier. "We are defiling our Earth, the fertile topsoil is disappearing, we are paving over nature, destroying the wilderness, decimating the biosphere, and will end up killing ourselves in the process. The world's ecosystem is breaking down. We are fast approaching the absolute limit of variability, and the limits of growth are becoming apparent" [18].

3. Mass media coverage of environmental topics

This article deals with news coverage of environmental issues. In line with the recent study conducted by Jankova, this article focuses on "modification of content analysis, miscellaneous approach to content analysis with quantitative topical base..." [19, p. 97]. The following nationwide daily newspapers in Slovakia served as the basis for our analysis: SME, PRAVDA. Both of these are published online as well as in print. Based on continuously updated statistical data (AIM monitor), we clearly see that the web pages of these two daily newspapers have a very high number of real-time users in comparison with the number of inhabitants in the Slovak Republic (we are not making comparisons with the tabloids here, however). The average number of monthly web site visitors (real-time users) oscillates around 1.3 million for Pravda and up to 2 million for SME. Hence, the target group is substantial enough for the designated topics to have a measurable impact on the readers. In my paper, I am analyzing the news coverage (brought by news agencies but partly also by journalists) that focuses on climate changes and global warming from September 2013 till May 2016. I am primarily interested in the frequency and content orientation of news outputs that focus on the topics of living environment.

My preliminary observation is that neither of the two examined media has a specialized section (column) dedicated to the issues of living environment. The daily newspaper Pravda gives a bit more space to this theme by including environmental topics into the science and technology column, within the sub-column titled "Earth". The daily newspaper SME sorts out articles with environmental topics based on the criteria of whether the topic covers domestic or worldwide happening. Again, there is no dedicated column or even a sub-column to the issues of environmental protection.

If we compare environmental topics coverage in Slovakia with those in the UK and Japan (based on published studies), the Japanese model of news coverage is the one closer to our model. Boykoff "found a steady increase in coverage in both countries, in contrast to the up-and-down cycle of mass-media coverage in Japan around the same period" [20, p. 205]. Slovak daily newspapers function on a similar model. Global warming and climate changes are the most frequent themes, however, their number has grown significantly in the recent period due to the approaching date of the Summit on Climate Change in Paris (November – December 2015) [21, p. 129]. There were visible resemblances to the situation in Japan in 1997 during the "The Third Conference of Parties to the UN Framework Convention on Climate Change (UNFCCC) in 1997, at which the Kyoto Protocol was adopted (...). The Japanese mass media gave this event quite a large amount of attention" [20, p. 205].

In terms of the news coverage frequency of environmental topics, the daily newspaper SME ranks first [Figs. 1 and 2]. It covers a wide diapason of topics with a rich variety of issues. Besides the notoriously discussed topics of climate change and global warming, it often enriches its contents by providing information about and partial analyses of the current state of affairs in other areas of interest: maintaining biodiversity, deforestation, air, soil, and water pollution, etc. Many authors chose to apply the attribute of proximity, focusing on local and regional events. In spite of a certain measure global skepticism with regard to finding and implementing solutions to the problems of living environment, we find a high percentage of texts that inform about positive steps being taken. Authors in both periodicals aspire to provide information with the highest possible complexity and accuracy, with the backing of hard evidence. Also clearly discernable is an active approach of news reporters and journalists in general, seeking to acquire solid material from scientific sources pertaining to topics of interest. In their quest for information, they do not shy away from contacting relevant, renowned academic and/or scientific institutions. In addition, academicians themselves are often the authors of the published texts. The readership may thus enjoy original articles as well as translations of texts from world famous experts. This type of contributions, however, demands a much larger space due to the need to present flawless scientific evidence using meticulous scientific argumentation. Such academic texts, therefore, differ from a typical news coverage by a more academic style and lexicon, a higher factual saturation [22]. Due to the limited scope of audience able to appreciate this type of texts, the general effort of both editorial offices is to make the contents of their newspapers accessible to as wide and as diverse readership as possible. Naturally, a substantial number of contributions are published directly from the news agencies without major editorial adjustments. The journalist work is, in such cases, deprived of the processes of the logical-terminological shaping that are typical for opinion shaping as well as analytical journalism or, to put it simply, for journalism of the rational type.

Blogs constitute another form of enrichment of the content dimension of individual online media. As a welcomed supplement to traditional journalism, blogs widen the editorial focus and

are able to bring different or supplementary opinions. Editors themselves may become bloggers, in addition to other individuals, experts or scientists interested in the given issue. Gavin Schmidt, a scientist from NASA who focused his blog entries on the topic of climate change, is a good example of a member from the scientific community who considers blogs a legitimate publishing platform. Global warming and climate changes are only sporadically communicated with an optimistic outlook. Most of the contributions constitute sobering, well-documented reminders that the global situation is quickly deteriorating: loss of biodiversity, rise of the surface level of the oceans, extreme temperatures and abrupt changes in weather patterns – all of these are statistically well documented. News messages are in both periodicals (Pravda and SME) mostly published on the basis of a certain event that has either a positive or (discernably) negative impact. Texts that are usually within a provincial frame of reference belong here. The topics of these texts refer to events such as the planting of new trees, founding new community gardens, etc., or they may provide information about a mass extinction of birds that had died due to food shortage, which is, in turn, a direct consequence of a warmer ocean, which precludes

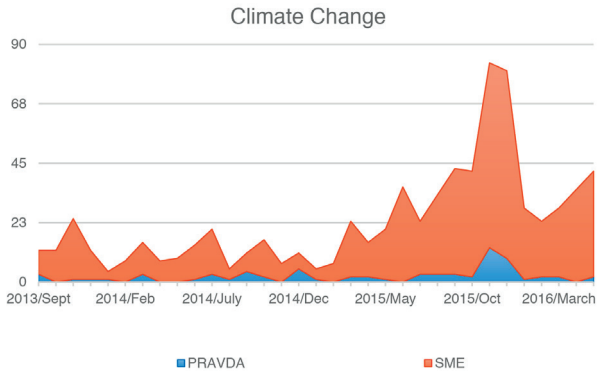


Fig. 1 Coverage and frequency of texts containing the terminological phrase "Climate Changes" in the online issue of the daily newspapers SME and Pravda

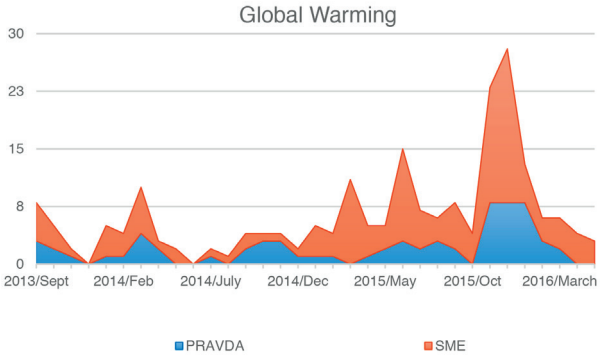


Fig. 2 Coverage and frequency of texts pertaining to global warming published online in both periodicals

the occurrence of certain kinds of fish. The examined opinion shaping daily newspapers do not define a unified conception or outlook on the examined issues. They rather approach each scientific output or summit/conference outcome individually. Another influencing factor that determines the art and quality of how each issue is presented is personal approach (preference/style) of the editor and also that of the author. The text is shaped by virtue of their perception of the topic, of the story and how the story is woven into a larger context. Readers are most interested in stories, relevant and exciting stories. After reading a text, they situate it into the context of their own experience and interpret it. Antosova offers an inciting study on the quality of the readers' interpretation of such texts [23]. Furthermore, she presents possibilities of interpretation not only by means of printed text but also through film as an audiovisual medium [24]. Pavlikova and Debnar propose a similar approach [25 and 26]. More research needs to be done on how journalists can influence the quality of media content reception.

4. Conclusions

It is of utmost importance to devote more academic attention to the study of media. Above all, our attention should focus on analyzing and examining the ways media can contribute to raising awareness of important environmental issues in society, educating and shaping the moral outlook of media content recipients. Besides using the traditional media, it is necessary to assess the impact of the new media and bring them into interaction with the more traditional ones. Their level of influence rises by means of the latest technological equipment and corresponding applications. Our current societies cannot imagine functioning without the electronic media, the Internet, or social (virtual) networks. These now become key platform in communicating the latest scientific findings, recommendations and guidelines. The media have the ability to influence public opinion and play a key role with respect to a truthful, objective, competent, and understandable communication. Both, content and terminological accessibility are important factors for adequate mediation of information. We agree on this point with Veverkova who maintains "that the language of journalism is considered to be serious language used in mass media, performing primarily its informative function which provides nonentertaining information about a specific topic" [27, p. 149].

Several experts argue that the information about climate changes or about the state and consequences of global warming are perceived by the public as more or less common, standard. Some media, therefore, implement the rule that offered scenarios and stories should be deliberately catastrophic in order to attract more readership attention. It does not always work this way, however. The topics of important summits and conferences are intertwined with the news of recent scientific discoveries. The

issue of living environment is a global problem and such challenge needs to be understood on a global level [28 and 29]. Based on the results of research it is clear that coverage of environmental issues in investigated Slovak media is on minimal space. The number of journalistic texts, which deals with the above topics (climate change, global warming), grows in proportion to the importance of data or news.

The media, furthermore, have the ability to synthetize and systematize information. However, they must not leave out the educational principle (or imperative) from the framework of communication [30]. This has been confirmed by the recent study of G. Jankova, titled: The socializing and educational function of media and marketing communication [19] and M. Pavlikova, titled: The Concept of Anxiety and its Reflection in Auden's work 'The Age of Anxiety' [31]. The recipients of media content build up their reading experience and shape their opinions. It is, therefore, important to pay attention to the cross-correlation function (CCF) between media coverage of a concrete topic and its reception by the audience (readership). Former research as well as present scientific studies from around the world prove that the living environment deserves our attention in all its aspects and that, if our attention is insufficient or inconsistent, it may have global consequences. The media play a crucial role in this process. The mass media, especially the new, online media and social networks of the present age, are able to modify, create and disseminate public opinion, constantly exerting a decisive influence on it and, in the better case, nurture a sense of responsibility in the mind of the public [32 and 33]. Thus, we should not underestimate how we reflect and respond to the challenges of living environment. To find a new "blue planet" will be an extremely difficult task...

References

[1] HELD, D., MCGREW, A.: *"The Great Globalization Debate: An Introduction," The Global Transformation Reader*, D. Held and A. McGrew (ed.), 2000, Oxford: Polity Press, 1-45. ISBN 978-0-7456-3135-6.

[2] HARVEY, D.: *The Condition of Postmodernity*. Oxford: Blackwell Publishers, USA, 1990, 392 p. ISBN 0-631-16292-5.

[3] JICKLING, B., LOTZ-SISITKA, H., O'DONOGHUE, R., OGBUIGWE, A.: *Environmental Education, Ethics, and Action: A Workbook to Get Started*. Nairobi: UNEP. 2006, 540 p. ISBN 92-807-2656-0.

[4] ROBERTSON, R.: *Globalization*. *Social Theory and Global Culture*. London: SAGE, 1992, 224 p. ISBN 978-0803981874.

[5] OLAUSSON, U.: Global Warming - Global Responsibility? Media Frames of Collective Action and Scientific Certainty. *Public Understanding of Science*, vol. 18, No. 4, 2009, 421-436. ISSN 0963-6625.

[6] DAVIES, A. R.: Is the Media the Message? Mass Media, Environmental Information and the Public. *J. of Environmental Policy and Planning*, vol. 3, No. 1, 2001, 319-323. ISSN 1522-7200.

[7] HANSEN, A.: The Media and the Social Construction of the Environment. *Media, Culture and Society*, vol. 13, No. 4, 1991, 443-458. ISSN 0163-4437.

[8] MCCOMAS, K., SHANAHAN, J.: Telling Stories about Global Climate Change: Measuring the Impact of Narratives on Issue Cycles. *Communication Research*, vol. 26, No. 1, 1999, 30-57. ISSN 0093-6502.

[9] VALCO, M., KRALIK, R., BARRETT, L.: Moral Implications of Augustine`s Philosophical and Spiritual Journey in his Confessions. *Communications - Scientific Letters of the University of Zilina*, vol. 17, No. 2, 2015, 103-108. ISSN 1335-4205.

[10] On this topic, see also: KRALIK, R., TOROK, L.: The Moment - Kierkegaard`s Attack upon Christendom. *European J. of Science and Theology*, vol. 12, No. 3, 2016, 112-120. ISSN 1841-0464.

[11] KONDRLA, P., KRALIK, R.: Authentic Being and Moral Conscience. *European J. of Science and Theology*, vol. 12, No. 4, 2016, 155-164. ISSN 1841-0464.

[12] BUTOROVA, E.: Legislative Definition of Advertisement in Slovakia and its Ethical Aspects. *European J. of Science and Theology*, vol. 12, No. 3, 2016, 205-211. ISSN 1841-0464.

[13] ROZNOVA, J.: Use of Art Types and Genres in Marketing Communication of Book Publishing Houses. *European J. of Science and Theology*, vol. 12, No. 2, 2016, 171-182. ISSN 1841-0464.

[14] BOYKOFF, M. T.: *Who Speaks for the Climate? Making Sense of Media Reporting on Climate Change.* Cambridge: Cambridge University Press, United Kingdom, 2011, 238 p. ISBN 978-0-5211-3305-0.

[15] ANTILLA, L.: Climate of Scepticism: US Newspaper Coverage of The Science of Climate Change. *Global Environmental Change*, vol. 15, No. 4, 2005, 338-352. ISSN 0959-3780.

[16] BURGESS, J.: The Production and Consumption of Environmental Meanings in the Mass Media: A Research Agenda for the 1990s. *Transactions of the Institute of British Geographers*, vol. 15, No. 2, 1990, 139-161. ISSN 0020-2754.

[17] STAHEL, R.: Environmental Responsibility and Environmental Security. *Filozofia*, vol. 70, No. 1, 2015, 1-12. ISSN 0046-385X.

[18] LOMBORG, B.: *The Skeptical Environmentalist. Measuring the Real State of the World.* Cambridge: Cambridge University Press, United Kingdom, 2001, 540 p. ISBN 0-521-01068-3.

[19] JANKOVA, G.: The Socializing and Educational Function of Media and Marketing Communication. *European J. of Science and Theology*, vol. 12, No. 3, 2016, 93-100. ISSN 1841-0464.

[20] SAMPEI, Y., AOYAGI-USUI, M.: Mass-media Coverage, its Influence on Public Awareness of Climate-Change Issues, and Implications for Japan's National Campaign to Reduce Greenhouse Gas Emissions. *Global Environmental Change*, vol. 19, No. 2, 2009, 203-212. ISSN 0959-3780.

[21] Boykoff "examined how the idea of anthropogenic global warming was covered in the US prestige press..." BOYKOFF, M. T., BOYKOFF, J. M.: Balance as Bias: Global Warming and the US Prestige Press. *Global Environmental Change*, vol. 14, No. 2, 2004, 125-136. ISSN 0959-3780.

[22] See MAZUR, A. M., LEE, J.: Sounding the Global Alarm: Environmental Issues, Sources, Problems and Values. *Public understanding of Science*, vol. 23, No. 4, 1993, 681-720. ISSN 0963-6625.

[23] ANTOSOVA, M.: Axiological Scope of Dominik Tatarka's Texts ('Philosophy of Love'). *European J. of Science and Theology*, vol. 12, No. 1, 2016, 129-137. ISSN 1841-0464.

[24] ANTOSOVA, M.: 'The Unfinished House' and 'A Step into Darkness'. Book versus Movie. *European J. of Science and Theology*, vol. 12, No. 3, 2016, 154-164. ISSN 1841-0464.

[25] PAVLIKOVA, M.: Despair and Alienation of Modern Man in Society. *European J. of Science and Theology,* vol. 11, No. 3, 2015, 191-200. ISSN 1841-0464.

[26] DEBNAR, M.: The Disappearance of the Author and Meaning Making. *World Literature Studies*, vol. 25, No. 3, 2016, 104-113. ISSN 1337-9690.

[27] VEVERKOVA, V.: Simplification of Language in Political Discourses Published in Tabloids. *European J. of Science and Theology*, vol. 12, No. 2, 2016, 145-154. ISSN 1841-0464.

[28] HANES, P., MASARIK, M.: Complementarity of Science and Theology. *European J. of Science and Theology,* vol. 12, No. 6, 2016, 5-20. ISSN 1841-0464.

[29] HETENYI, M.: Religious Problems of the Hungarian Minority in Slovakia in the Years 1918-1938. *European J. of Science and Theology*, vol. 12, No. 2, 2016, 111-121. ISSN 1841-0464.

[30] KONDRLA, P., KRALIK, R.: The Specifics of Mission of the Thessalonian Brothers and the Potential for their Actualization. *Konstantinove listy*, vol. 9, No. 2, 2016, pp. 90-97. ISSN 1337-8740.

[31] PAVLIKOVA, M.: The Concept of Anxiety and its Reflection in Auden's work 'The Age of Anxiety', *European J. of Science and Theology,* vol. 12, No. 4, 2016, 111-119. ISSN 1841-0464.

[32] This positive scenario, however, is not always the case, as Valco points out in his recent study on the foundations of liberal society. He argues that the "global media corporations have a great deal of control over what goods, news, and information people have access to. These corporations spend vast amounts of money to figure out what buzzwords and cultural mirages their target audiences will respond to. Their goal, though unarticulated, is clear: to be more efficient in marketing whatever it is they (the new political aristocracy, social engineers, and/or economic oligarchs) wish to sell – products, services, values, or general outlooks." VALCO, M.: Rethinking the role of Kierkegaard's 'Authentic Individual' in liberal capitalist democracies today. *European J. of Science and Theology*, vol. 11, No. 5, 2015, 129-139. ISSN 1841-0464.

[33] VALCOVA, K., PAVLIKOVA, M., ROUBALOVA, M.: Religious Existentialism as a Countermeasure to Moralistic Therapeutic Deism. *Communications - Scientific Letters of the University of Zilina*, vol. 18, No. 3, 2016, 98-104. ISSN 1335-4205.

Translated by Michal Valco.

Ciprian Turcan*

HANS JONAS' ETHICS OF TECHNOLOGY: RISKS OF TECHNOLOGICAL SOCIETY

Until the mid-20th century can be observed romantically (almost utopian) minded optimism, that accompanied technological progress. Technical innovations have been evaluated mainly in terms of their positive contribution, especially in the economic sphere. In the second half of this century, the technological optimism gradually faded and was replaced by skepticism and negativism. Hans Jonas is among the first philosophers who managed to discern and appreciate the high-risk potential of technological power. Jonas formulated an ethical theory that might be able to adequately respond to the perils of a technological society. This paper focuses on Jonas' understanding of the perils of technological practice within his concept of modern society which, due to the way it functions, threatens its own existence. Our aim is also to point out contemporary obstacles to applying his ethical solutions.

Keywords: *Hans Jonas, technology, society, risks, ethics.*

1. The Nature of Modern Technology

Jonas develops his philosophical concept of technology and of technological civilization on the basis of distinguishing modern technology from pre-modern technology. He finds out that "major distinction is that modern technology is an enterprise and process, whereas earlier technology was a possession and a state" [1, p. 34]. While pre-modern technology exhibits "a given inventory of tools and procedures used to be fairly constant, tending toward a mutually adjusting, stable equilibrium of ends and means" [1, p. 34], modern technology applied in the production of new type of machinery in the second half of the 18th century "is an enterprise and not a possession, a process and not a state, a dynamic thrust and not a set of implements and skills" [1, p. 35]. From a formal point of view, Jonas understands modern technology as "an abstract whole of movement ... as a continuing collective enterprise, which advances by its own 'laws of motion'" [1, p. 34]. In terms of its contents, Jonas understands it as a force able to artificially widen the sphere of human being, to dictate new goals, needs and desires. If premodern technology concentrated on the saturation of pragmatically limited goals, i.e. on the adjustment of means to constant goals, then modern technology loses this purely instrumental character. For modern technology, "the relation of means to ends is not unilinear but circular ... technology thus adds to the very objectives of human desires, including objectives for technology itself" [1, p. 35]. This aspect leads directly to a progressive escalation of human needs, indirectly creating a hidden utopist dimension of modern technology, in which "technology as a grand venture tends to establish itself as the transcendent end" [1, p. 38].

According to Jonas, the development of technology has the tendency to grow independent and to present itself as an autonomous driving force, rendering a meaningful supervision of this force increasingly difficult. Whereas the pre-modern technology acted as a force in the service of society through which humans exerted their influence on nature, modern technology expresses itself like the very nature itself – it becomes unrestrained, uncontrollable, necessary force, ruling over humans, so that humans are becoming helpless against this technology. Human being turns from being the subject of technology into its object. Technological civilization thus by its immanent dynamics creates "the new realm of necessity", in which "the almighty we, or Man personified is, alas, an abstraction" [1, p. 42]. A new, pathological situation arises. In an unprecedented measure, both in terms of intensity as well as extensiveness, man affects nature through technology which he himself no longer fully masters. The result is that his endeavor threatens not only the reproduction of nature itself but such endeavor entails the threat of humanity's own demise. The loss of self-control rests not only in the inability to protect nature from humans but also to protect humans from themselves [2, pp. 141-142].

* **Ciprian Turcan**
Department of General and Applied Ethics, Faculty of Arts, Constantine the Philosopher University, Nitra, Slovakia
E-mail: cturcan@ukf.sk

The essence of modern technology thus rests in its alienation from humans. If we wanted to locate Jonas' concept in a wider philosophical discourse, we could point out its affinity with the views of M. Heidegger (Jonas' teacher), or J. Ellul. The world of technology, according to these thinkers, becomes a relatively autonomous sphere which, in reverse, actively influences its own makers, thus participating in the creation of their goals, expectations, demands and values. The sphere of modern technology has, so to speak, its own pace of life. According to Ellul, autonomy of technology means "that technology ultimately depends only on itself, it maps its own route ... autonomy is the very condition of technological development" [3, p. 125]. The representatives of the critical Frankfurt School offer a similar characterization of this phenomenon. Horkheimer and Adorno, for example, argue that "technical rationality today is the rationality of domination. It is the compulsive character of a society alienated from itself" [4, p. 95]. According to Marcuse, "the technological society is a system of domination which operates already in the concept and construction of techniques" [5, p. xlvi].

2. The Perils of Technological Society and their Complexity

Jonas sees the cause for technological society's becoming a threat to itself in the exaggerated success of Bacon's ideal, wherein human becomes the master over nature by means of technology based on science: "what we are experiencing today is the paradox of excessive success that threatens to turn into a catastrophe by destroying its own foundation in the natural world" [6, p. 828]. This success comes essentially in two kinds: economic and biological. The often emphasized economic side of the success rests in the growth of the overall factory production and consumption, alongside with the decrease of necessary human labor and the immediate increase of prosperity of the growing population. The second side of success is an exponential growth of the world's population. Both aspects are closely interconnected, both existing in a mutually conditioned relationship. Economic success, on the one hand, which in and of itself contributes to ecological crises by virtue of it unsustainable depletion of limited natural resources, entails the growth of world population; population growth, on the other hand, conversely influences economic development – not only does it expedite the development itself, it also robs economic development of its ability to slow down and stabilize itself. Population growth thus requires economic growth and economic growth causes further population expansion. The imperative of exponential growth, therefore, necessarily becomes the principle imperative of technological civilization.

The phenomenon of "success" explains the source of the dynamics of technological power and, at the same time, the core of its crises, because an economic and population growth that is not quantitatively limited, is unsustainable within a finite natural system. It also reveals another essential aspect, a way by which the power of technology interiorized itself in society. Modern technology must not be perceived in isolation as an instrumental force. We should rather see it in a complexity, within the context of modern society. The scientific-technological progress constitutes a social force which dictates not only its own pace but also the dynamics and direction of where humanity is headed in the present. It is important to realize that the perils of technological civilization are no longer connected to its external actions and dangers (as it used to be in traditional societies), but they are its internal, immanent quality, they are implicitly connected with its own functioning. Even the central conflict of technological civilization – the conflict of humans versus nature – assumes a new shape. By virtue of its systematic, dramatic exertion of influence on nature, modern technological society does not actually emancipate itself from nature (in accordance with Bacon's ideal). On the contrary, it socializes nature, whereby ecological crisis actually becomes a social crisis. According to Beck, "at the end of the twentieth century, nature is neither given nor ascribed, but has instead become a historical product, the interior furnishings of the civilizational world, destroyed or endangered in the natural conditions of its reproduction. But that means that the destruction of nature, integrated into the universal circulation of industrial production, ceases to be 'mere' destruction of nature and becomes an integral component of the social, political and economic dynamic" [7, p. 80].

The civilizational perils, which are not expressions of a dysfunction but rather systemic consequences of technological development, impact all spheres of society. It is not merely about some dangers that are immediately linked to technological practice, such as the threat of a nuclear war, genetic engineering, artificial intelligence, or perils related to the ecological crises, such as global warming, pollution of water, soil, and air, or the damages to the Ozone layer. In the shape of externalities of technological progress, dangers are being massively produced also in the social sphere. Their effect is essentially long-term and latent in nature. The already mentioned population growth, for example, contains another indirect risk factor in the form of territorial concentration of population, as Lorenz points out: "the overcrowding of many people into a small space leads, not only indirectly through exhaustion of interhuman relationship, but also directly, to aggressive behavior" [8, p. 13]. We are dealing here with a whole complexity of risk factors in the area of social classes, employment and vocation, forms of family life, gender status, marriage, parenthood – risk factors that considerably weaken the structure of modern society and lead to dissolution of social ties and commonly held values because "morality and values ... are integral parts of human communities - they are necessarily (by definition) socially embodied, not individually based" [9, p. 104 and 11].

Jonas realized this complexity of risk factors and their potential consequences in the social sphere. He maintained that "in the pervasive mentalization of physical relationships it is a trans-nature of human making, but with this inherent paradox: that it threatens the obsolescence of man himself, as increasing automation ousts him from the places of work where he formerly proved his humanhood. And there is a further threat: its strain on nature herself may reach a breaking point" [10, p. 40]. In addition to pointing out the risk of mass unemployment, Jonas formulates a serious moral-philosophical question: whether human beings are indeed able to adjust to the dynamic and conditions of the technological age and whether we are able to constructively manage the phenomenon of "shock from the future" (Toffler). This is not just an individual problem (e.g. in the form of an "existential despair of the modern man who tries to find his way toward creating a relationship with the world" [11, p. 192]), but primarily a social and political problem concerning whether or not we are able, as society, to adjust our social and political institutions to the dynamic and conditions of the technological age.

3. Ethics for a Technological Civilization

Jonas warns that modern technology has changed the very nature of human action. Therefore,

"the changed nature of human action calls for a change in ethics as well ... modern technology has introduced actions of such novel scale, objects, and consequences that the framework of former ethics can no longer contain them" [1, p. 1, 6]. The implicit presupposition of the former type of ethical thinking was the notion that the essence of human being and his fundamental situation is essentially unchangeable and untouched by technological practice. Due to the limited power of human action, moral norms were oriented toward immediate relationships among people [12]. Immediate criteria were at our disposal when we dealt with the question of right action. It remained linked with actions behind which it could clearly identify their original agent (source). In its former calculations, ethics did not have to take into account the global conditions of human society, its remote future, or the very existence of humanity. On top of that, traditional ethics could well remain strictly anthropocentric because human action did not threaten the natural order of being, including the very human nature itself.

The changed context of human action relativizes these presuppositions. Technological praxis ceases to be neutral in ethical sense because its consequence constitutes an existential threat for the whole humanity. The impact of technological activities surpasses by far the closed circle of temporal and spatial immediacy. Formerly irrelevant factors, such as: one-sidedness and irreversibility of the effects of technological practice constituting causal relations, the spatial impact and time duration of which are often unknown; the cumulative effect of the technological transformation of the world that continues to overcome the immediate circumstances of each performing act - these need to be included in our current ethical deliberation. A strict anthropocentric orientation is no longer tenable. New ethics requires a holistic dimension based on "the reconciliation between our presumptuous special status as humans and the universe as a whole, which is the source of our life" [6, p. 826].

Without negating any previous ethics, Jonas formulates an ethical theory the normative principle of which is responsibility towards future generations as ontological care for sustaining life, guided by the vision of highest evil. There is a new categorical imperative at its core: "act so that the effects of your action are compatible with the permanence of genuine human life" [2, p. 11]. Jonas did not stop with the formulation of new ethics but devoted himself to examine the possibility of its application in practice. The power that would be capable to assume responsibility over the dynamic of technology, according Jonas, must arise from the society itself. Since the power of modern technology is not a singular power of an individual but rather a collective power of the society, the ethical imperative should assume the form of a political solution.

4. An Open Question – Responsibility or Moral Hazard?

The relevance of Jonas' theory will during the course of time depend primarily on whether or not humanity continues to threaten its own survival. The continuity of an exponential growth, despite economic crisis, the continuity of global pollution of natural environment, and the continuing expansion of the power of technology substantiate positive answer to the question. Contemporary research, too, confirms that "the warnings that we received in 1972 ... are becoming increasingly more worrisome as reality seems to be following closely the curves that the ... scenario had generated" [13, p. 3]. If a threat continues to be our unsurpassed context, a new question arises: what are the current possibilities of applying Jonas' principle of responsibility in practice? The situation seems to be more critical from this perspective than Jonas himself may have anticipated because politics, which should have been the subject of new responsibility, has been losing its position and power under the condition of global capitalism and post-industrial society.

As Beck shows so convincingly, future is no longer decided in parliaments but directly in research labs and board of directors offices of corporations. Not just about future technological development but also estimates of detrimental side effects are being made under the pressure of investment decisions. Politics, which should be an institution of democratic and rational shaping of the will of the society, thus becomes an institution of legitimization the role of which is to legitimize the already pronounced conclusions as well as consequences

that politics itself did not cause and that it cannot avoid. As a result of this, "the non-responsibility of science corresponds to the implicit responsibility of the businesses and the mere responsibility for legitimation of politics. 'Progress' is social change institutionalized into a position of non-responsibility" [7, p. 214]. As a result, "the non-responsibility of science corresponds to the implicit responsibility of the businesses and the mere responsibility for legitimation of politics. 'Progress' is social change institutionalized into a position of non-responsibility" [7, p. 214].

There are other factors that promote limiting politics to legitimization. The precariousness of work, growth of structural unemployment and inequalities in distribution of wages ("inequalities of wealth that had supposedly disappeared are close to regaining or even surpassing their historical highs" [14, p. 471]), force individual states to fight for survival in the form of raising their competitiveness abilities. The main priority of politics becomes economic policy making, which further expands the decision making abilities of large businesses. By doing this, politics itself is giving up its power and diminishes its maneuvering space for responsible action in the area of technological politics. A fateful faith in progress which requires no political-democratic legitimization and which even assumes the form of a "secular religion of modernity" [7, p. 214] becomes the main driving force of society. The contemporary global orientation of humanity thus reminds us more of a moral hazard with our future than a politics of responsibility.

References

[1] JONAS, H.: Toward a Philosophy of Technology. *Hastings Center Report*, vol. 9, No. 1, 1979, 34-43. ISSN 1552-146X.

[2] JONAS, H.: *The Imperative of Responsibility: In Search of Ethics for the Technological Age*. Chicago: University of Chicago Press, 1984. ISBN 0-226-40597-4.

[3] ELLUL, J.: *The Technological System.* New York: The Continuum Publishing Corporation, 1980. ISBN 0-8264-9007-4.

[4] HORKHEIMER, M., ADORNO, T. W.: *Dialectic of Enlightenment*. Stanford: Stanford University Press, 2002. ISBN 0-8047-3632-4.

[5] MARCUSE, H.: *One-Dimensional Man. Studies in the Ideology of Advanced Industrial Society*. New York: Routledge, 2002. ISBN 978-0-415-28976-4.

[6] JONAS, H.: Philosophy at the End of the Century: A Survey of Its Past and Future. *Social Research*, vol. 61, No. 4, 1994, 813-832. ISSN 0037-783X.

[7] BECK, U.: *Risk Society: Towards a New Modernity*. London: SAGE Publications, 1992. ISBN 0-8039-8346-8.

[8] LORENZ, K.: *Civilized Man's Eight Deadly Sins*. New York: Harcourt Brace Jovanovich, 1974. ISBN 0-15-118061-X.

[9] VALCO, M., KRALIK, R., BARRETT, L.: Moral Implications of Augustine's Philosophical and Spiritual Journey in his Confessions. *Communications - Scientific Letters of the University of Zilina*, vol. 17, No. 2, 2015, 103-108. ISSN 1335-4205.

[10] Naturally, the crisis of values affects primarily the youth, with consequences on several levels of human inner disposition and external interactions. For a recent treatment of its effects on one's faith and religious life, see: VALCOVA, K., PAVLIKOVA, M., ROUBALOVA, M.: Religious Existentialism as a Countermeasure to Moralistic Therapeutic Deism. *Communications - Scientific Letters of the University of Zilina*, vol. 18, No. 3, 2016, 98-104. ISSN 1335-4205. On the question of the role of the individual in contemporary society, see: VALCO, M.: Rethinking the role of Kierkegaard's 'authentic individual' in Liberal Capitalist Democracies Today. *European J. of Science and Theology*, vol. 11, No. 5, 2015, 129-139. ISSN 1841-0464.

[11] PAVLIKOVA, M.: Despair and Alienation of Modern Man in Society. *European J. of Science and Theology*, vol.11, No. 3, 2015, 191-200. ISSN 1841-0464.

[12] Ethics remains, even in its contemporary conceptions, anchored primarily in the social context, including the principle of responsibility. On this topic, see: JUROVA, J.: On Etzioni's Concept of a Responsive Community. *European J. of Science and Theology*, vol. 12, No. 3, 2016, 71-80. ISSN 1841-0464; KONDRLA, P. & KRALIK, R.: The Specifics of Mission of the Thessalonian Brothers and the Potential for their Actualization (in Slovak). *Konstantinove listy*, vol. 9, No. 2, 93-99. ISSN 1337-8740.

[13] BARDI, U.: *The Limits to Growth Revisited.* New York: Springer, 2011. ISBN 978-1-4419-9415-8.

[14] PIKETTY, T.: *Capital in the Twenty-First Century*. Cambridge: Belknap Press, 2014. ISBN 978-0-674-43000-6.

Translated by Michal Valco

Martina Pavlikova*

READING AUDEN AS A RESOURCE FOR EXISTENTIAL REFLECTION IN A SOCIETY WITH TECHNOCRATIC AND HEDONISTIC TENDENCIES

The aim of this paper is to highlight the importance of a remarkable writer, Wystan Hugh Auden (1907 - 1973), who was strongly influenced by the philosophy and thinking of the Danish philosopher, Soren Kierkegaard, especially by his works Either - Or, The Concept of Anxiety, Works of Love and The Sickness Unto Death. Auden's poetry is noted for its stylistic and technical achievement, its engagement with politics, morals, love, purity and religion, and its unique variety in tone, form and content. It is enormously rich in allusions, poetic tone and intellectual power. The content of his poems ranges from philosophical meditations, the concept of being, the concept of man, anxiety, aloneness and despair, to the contemporary crises of modern man and the evolution of society. His poetry becomes a resource for existential reflection in modern society with the technocratic and hedonistic tendencies of consumer society of which this paper is an in-depth analysis.

Keywords: *Kierkegaard, poetry, moral, love, religion, society, hedonism, technocratic tendency, consumer society.*

1. Introduction

Wystan Hugh Auden is one of the greatest and most influential poets of modern times. His verse combines evocative descriptions of his inner world and feelings with personal responses to the major events of the 20th century. At the same time, he is a most inward and subjective poet. Considered individually, his poems are often extremely obscure. They are therefore less 'suited' than those of most modern poets to the kind of critical treatment that begins by considering the poem as an isolated, independent and discrete entity. The odd impersonality of W.H. Auden consistently lends his poetry, even at its deepest insight into the human heart, an air of strangeness. Thus, according to Kirsch (2005), "Auden always insisted on the material, the physical, ultimately all the realities and necessities of man's bodily condition, in human experience, and the proper understanding and acceptance of the flesh and its relation to the spirit" [1, p. 27].

Auden wrote many different kinds of poetry, in highly varied styles and forms. He wrote compressed short stories, plays, biographical and critical essays. He used the traditional genre, sonnet, elegy, eclogue, song, epistle, oratorio, drama and wrote occasional poems on private and public events.

2. Christian narrativity and symbolism in the poems

After 1939, Auden's literary work was strongly influenced by the Danish philosopher Soren Kierkegaard, whose writings were introduced to him by Paul Tillich, Reinhold Niebuhr, Nicolas Nabokov and Charles Williams. In Kierkegaard, Auden found what amounted to a theological foundation in his poetry [2]. The Danish philosopher had made careful distinctions between the aesthetic, the ethical and the religious modes of existence and Auden implemented these into his own literary work. Auden realized that "faith offers a new horizon of meaning of one's being" [3, p. 159].

For Auden, "Kierkegaard's belief that a man is related in his life to an unconditional absolute that he must continuously search for but never fully know, resonated profoundly with Auden's own spiritual instincts of faith and doubt, as did Kierkegaard's consequent exploration of man's existential relationship with God in his everyday life" [1, p. 23].

In one of his last poems, *Thanksgiving*, Auden wrote that: "Wild Kierkegaard, Williams and Lewis" [4, p. 316] guided him back to belief. This is also reflected in another passage from Auden's anthology of Kierkegaard's works: "Kierkegaard was neither a poet nor a philosopher, but a preacher, an expounder and defender of Christian doctrine and Christian Conduct" [5, p. vii]. Kierkegaard's legacy helped Auden create his own ideas about

* **Martina Pavlikova**
Faculty of Arts, Constantine the Philosopher University, Nitra, Slovakia
E-mail: mpavlikova@ukf.sk

Christianity. This compelled Auden to write more on theological topics. Regarding this matter, he wrote: "There is a faith by which a man lives his life as a man, i.e. the presuppositions he holds in order that 1. he may make sense of his past and present experience; 2. he may be able to act toward the future with a sense that his action will be meaningful and effective; 3. that he and his world may be changed from what they were to something more satisfactory" [6, p. 109]. For Auden, the combination of poetry and faith fulfilled all three important criteria.

American professor of English, Arthur Kirsch, notes that Auden's faith "expanded the horizons of his mind as well as his heart, and his formidable intelligence, in turn, probed the nature and limits of his Christian belief, animating his continuous quest not only to believe still but also to believe again" [1, p. xi]. When leaving Europe, Auden had to make a choice to either leave and save his life, or stay in Europe risking death and facing the imminent horror of Hitler's regime. This reminds us of Kierkegaard's predicament, as Roman Kralik and Luboš Torok point out: "for Kierkegaard the either - or choice is typical" [7, p. 69]. Similar to Kierkegaard, Auden was forced to make a comparable choice. However, Auden's choice was more acutely existential.

Edward Mendelson suggests that: "Kierkegaard's existential Christianity offered two strengths that psychoanalysis and politics could not: it perceived its relation to an absolute value; and it understood that it could never claim to know or embody that value. Auden scarcely needed Kierkegaard's absolute to know that Hitler was in the wrong, but because it obliged him to acknowledge that he too was in the wrong, he could believe its implicit judgment against Hitler more thoroughly than he could believe judgments that gave secret consolations to vanity" [8, p. 130]. Gareth Reeves explains the meaning of Kierkegaard's view of humanity: "Kierkegaard's view of humanity as made up of conscious beings perpetually obliged to exercise their free will to choose from an infinity of foreseeable possibilities, means that each individual presents his unique case" [9, pp. 191].

According to Arthur Kirsch: "By 1938, issues of Christian faith become quite unmistakable in Auden's work" [1, p. 15]. Auden's poem, *As I walked out one evening,* is very specific. The first part of this ballad describes eternal hopes of romantic love. The second part describes the conquest of such love in terms of Time. In ballad, the lover confesses love to his beloved woman. He stresses that his "love has no endings" [4, p. 66]. However, in the distance, all clocks in the city began to whirr and chime: "O let not Time deceive you, You cannot conquer Time" [4, p. 66]. The clock becomes a reminder of uncompromising reality of mortality and of the imperfection of human life. Then the clocks order the people: "You shall love your crooked neighbor with your crooked heart" [4, p. 67]. For Auden, it was an "internalization of the biblical injunction, a religious understanding and alleviation of his own sense of isolation and a movement toward the self-forgiveness that was the necessary condition for his love of his neighbor" [1, p. 17].

"O look, look in the mirror,
O look in your distress,
Life remains a blessing
Although you cannot bless.
O stand, stand at the window
As the tears scald and start,
You shall love your crooked neighbor
With your crooked heart" [4, p. 67].

Christian symbolism is present also in the line that emphasizes that man is imperfect and essentially powerless: "life remains blessings, although you cannot bless" [4, p. 67]. In the final stanza of the poem *As I Walked Out One Evening*, the cessation of the clocks draws the poem back from the terms of time. Auden expressed his thoughts on time in mordantly explicit terms:

"What right have I to swear
Even at one a.m.
To you till I die?
Earth meets too many crimes
For fibs to interest her,
If I can give my word,
Forgiveness can recur
Any number of times
In Time. Which is absurd.
Tempus fugit. Quite.
So finish up your drink.
All flesh is grass. It is." [4, p. 271]

What we hear here is an echo of the Biblical text from Isaiah 40:6-8: "The voice said, 'Cry out!' And he said, 'What shall I cry?' All flesh *is* grass, and all its loveliness *is* like the flower of the field. The grass withers, the flower fades, Because the breath of the Lord blows upon it; Surely the people *are* grass. The grass withers, the flower fades, But the word of our God stands forever" [10, p. 95].

3. The Concept of Suffering

In his poems, W. H. Auden also developed a unique concept of suffering. One of his finest pieces is the poem *September 1, 1939*. The poem was written in 1939, just as German troops invaded Poland and began the Second World War. Auden begins his poem with the speaker sitting in a dive bar in New York City. Hitler's actions have brought the "low dishonest decade" to a close, bringing "the unmentionable odor of death" to the September evening. Auden notes how, despite all imperfections, "we must love one another or die" [4, p. 97]. He was convinced, that to love one another truly is possible only when we start to perceive our neighbor as human being created by God in his own image. He added that loving one's neighbor "is a bodily, blood relationship" [11, p. 297]. Auden also asks:

"Our bodies cannot love:
But without one,
What works of Love could we do?" [12, p. 713].

Because of the rising power of Hitler and the Second World War, Auden was forced to leave Europe and began his new life in the USA. Similar to Tillich, Auden "came to understand Kierkegaard better through the suffering of the 1st World War, in which he served as a field spiritual on the Western Front and where he lived through real anxiety" [13, p. 187]. His poem *September 1, 1939* reflects the existential anxiety of a displaced person:

"I sit in one of the dives
On Fifty-Second Street
Uncertain and afraid
As the clever hopes expire
Of a low dishonest decade:
Waves of anger and fear
Circulate over the bright
And darkened lands of the earth,
Obsessing our private lives,
The unmentionable odor of death
Offends the September night" [4, p. 91].

Auden argues that during war-time "everybody is reduced to the anxious status of a shady character or a displaced person" [14, p. 3]. Issues pertaining to displaced individuals and communities have always been complex and difficult to deal with. American scholar Hubert Jurjewicz in his paper titled *Mechanisms through which spirituality leads to resilience for immigrants* highlights the complicated life of immigrants and points out different problems connected with immigration: "Mechanisms through which spirituality leads to resilience for immigrants – short scheme: 1. Spirituality – problems encountered by immigrants: racism, lack of money, no family ties, culture shock, food & basic necessities and fear of deportation. 2. Mechanisms - healing mental injury, strengthening personal relationships, reducing anxiety & depression, maintaining a positive outlook, accepting change as part of life and changing attitudes towards problems. 3. Resilience – some problems persist, but individuals are 'used' to them. They resume relative normality in spite of the hitherto existing challenges" [15, p. 24].

For a better understanding of Auden, it is important to note that in the first stanza of his poem, the term "alone" clearly presents the conflict between the individual and the state and the individual's moral responsibility. In the fourth stanza the poet focuses on New York City, where he settled after his arrival from Europe.

"Where blind skyscrapers use
Their full height to proclaim
The strength of Collective Man,
Each language pours its vain
Competitive excuse:
But who can live for long
In a euphoric dream:
Out of the mirror they stare,
Imperialism's face
And the international wrong.
Faces along the bar
Cling to their average day:
The light must never go out
The music must always play" [4, p. 96].

The city represents modern capitalism. Auden outlines "blind skyscrapers" [4, p. 96] that "proclaim the strength of Collective Man" [4, p. 96] via competition and diversity. The ultimate reason for this social blindness is isolationism. People are tied to their average lives; they desire to pursue their happy dreams, and they keep the music playing and the lights on so that they will never see how morally lost they are. They trust the government or the capitalist telling them to remain neutral and unbiased for their own sake, which fits their egoistic and sensual desires to fulfill their selfish goals without regard for what is happening in Europe.

Auden developed in his poems a unique concept of suffering. One of his masterpieces, the poem *Musée des Beaux Arts*, depicts the human position of suffering in the "dispassionate landscape of the daily life of man as well as of nature" [1, p. 18]. It is the only poem that Auden based on a specific painting. The painting concerned was Brueghel's picture *The Fall of Icarus*. "The poem, in its brisk survey of quotidian life, in the midst of which astonishing events take place" [16, p. 99]:

"About suffering they were never wrong.
The Old Masters: how well they understood
Its human position, how it takes place
While someone else is eating or opening a window or just walking dully along" [4, p. 87].

The second stanza of the poem reflects Auden's focus on Brueghel's painting of the fall of Icarus. In Christian narration, Icarus is a figure often interpreted as a type of Christ. Auden describes:

"In Brueghel's Icarus, for instance: how everything turns away
Quite leisurely from the disaster, the ploughman may
Have heard the splash, the forsaken cry,
But for him it was not an important failure, the sun shone
As it had to on the white legs disappearing into the green
Water, and the expensive delicate ship that must have seen
Something amazing, a boy falling out of the sky,
Had somewhere to get to and sailed calmly on" [4, p. 87].

The moral message of this poem concerns human indifference, which is a manifestation of the moral failure and refusal to love one's neighbor. Just in refusing to love one's neighbor Auden sees a fundamental violation of the Christian faith and considers it a serious sin. The poem also presents another interpretative dimension. "Both stanzas of *Musée des Beaux Arts* derive their power from the juxtaposition of momentous suffering with the unconcerned lives of ordinary people" [1, p. 20]. The poem has enjoyed "an unusual popularity, and this may well be due to the

way in which the mythic or miraculous subject of the painting is subdued and domesticated to our habitual and quotidian experience" [16, p. 100].

Another poem by Auden which reflects suffering is *Refugee Blues*. This poem laments the plight of the Jews who were forced to escape from Europe when the Holocaust started and Jews were killed or imprisoned under the cruel regime of Hitler which sentenced them all to death. The narrator of the poem thinks that he heard the rumbling of an imminent storm, but finally, it was Hitler sentencing all Jews to death: "I heard the thunder rumbling in the sky, it was Hitler over Europe, saying: 'They must die'" [4, p. 92]. It is a chilling and depressing poem about suffering which reminds one of the extents to which humanity can fall, becoming beasts and cruel, thirsty for each other's blood and lives. Auden reminds how seriously humanity can fail:

"Say this city has ten million souls,
Some are living in mansions, some are living in holes:
Yet, there's no place for us, my dear, yet there's no place for us.
Once we had a country and we thought it fair,
Look in the atlas and you'll find it there:
We cannot go there now, my dear, we cannot go there now" [4, p. 91].

4. The Concept of Love

Auden's poetry was also affected by a very unusual mystical experience of Agape. He highlights a formative, mystical episode which he experienced one summer night in 1933 while he was spending pleasant time with some colleagues:

"I felt myself invaded by a power which, though I consented to it, was irresistible and certainly not mine. For the first time in my life I knew exactly, because thanks to the power, I was doing it–what it means to love one's neighbor as oneself. My personal feelings towards them were unchanged–they were still colleagues, not intimate friends-but I felt their existence as themselves to be of infinite value and rejoiced in it" [16, p. 69-70].

Auden later describes this feeling as a vision of 'Agape,' or a kind of brotherly love. He perceived them as sexless human beings and encountered absolutely pure love. Because of this experience he aligned his faith with the moral, human imperative to love one's neighbor as one's self.

Auden's view of romantic love, however, is not only an expression of his personal temperament, but in turn reflects his religious attitude: Auden always honored and respected the state of marriage. He emphasized that: "Like everything which is not the involuntary result of fleeting emotion but the creation of time and will, any marriage, happy or unhappy, is infinitely more interesting and significant than any romance, however passionate" [17, p. 248].

Every image Auden invokes signifies a symptomatic condition of society or individual psychology. His poetry also reflects a unique concept of love. Auden developed this concept in one of his most admired, quoted and anthologized poems, which he was eventually to title his poem *Lay Your Sleeping Head My Love.* According to Hecht, in this poem Auden "made at least one change in the course of time: in the last line of the second stanza, which originally went 'The hermit's sensual ecstasy,' the word 'sensual' was changed to 'carnal.' Within the wide spectrum of love, including love as mysteriously curative of both individual and social ills, the love described here is vulnerable, touching, and decently screened as regards gender" [18, p. 103].

"Lay your sleeping head, my love,
human on my faithless arm,
Time and fevers burn away
Individual beauty from
Thoughtful children, and the grave
Proves the child ephemeral,
But in my arms till break of day
Let the living creature lay,
Mortal, guilty, but to me
The entirely beautiful" [4, p. 53].

Auden's poem *Alone* is another philosophical meditation on love. The poem analyzes the difference between the aching that is linked to being the subject of someone's love and being alone. Are we, human beings really alone? What is the essence of human relationships? Auden suggests the metaphysical presence of God in the life of each human by highlighting that we are never alone.

"Each lover has some theory of his own
About the difference between the ache
Of being with his love, and being alone:
Why what, when dreaming, is dear flesh and bone
That really stirs the senses, when awake,
Appears a simulacrum of his own.
Narcissus disbelieves in the unknown;
He cannot join his image in the lake
So long as he assumes he is alone.
The child, the waterfall, the fire, the stone,
Are always up to mischief, though, and take
The universe for granted as their own.
The elderly, like Proust, are always prone
To think of love as a subjective fake;
The more they love, the more they feel alone.
Whatever view we hold, it must be shown
Why every lover has a wish to make
Some kind of otherness his own:
Perhaps, in fact, we never are alone" [19, p. 312].

5. Conclusion

Auden's existential poems reflect a moral, spiritual and imaginative approach towards life. All his authorship highlights love and warns against the human cruelty that comes from war.

Our contemporary society is more or less consumer oriented. Reading Auden can morally and spiritually enrich each reader, cultivating in him a sense of longing for a deeper meaning of life. Auden's legacy remains very appropriate for current modern society. After his emigration to the United States, Auden's poems reflect powerful Christian narration and religious symbolism. Auden "was a great poet and critic, but he should also be remembered, and would have wished to be remembered, as a man who sought to lead a Christian life" [1, p. 179]. Auden's concepts of love, aloneness and suffering can play the role of a spiritual guide for the individual modern man when faced with the problems of life in a society marked by hedonistic and technocratic tendencies. "The path to an authentic subjectivity seems to lead inevitably through the complicated and sometimes painful struggles of life. One should not expect to make sense of his own life without an arduous struggle to interpret one's existence in relation to self, the world, and to God. The power and wisdom of such interpretation [...] comes from God as the source, guide, and goal of the journey" [20, p. 106].

References:

[1] KIRSCH, A.: *Auden and Christianity*. New Haven: Yale University Press, 2005. ISBN 978-0-300-10814-9.

[2] For more on despair in Kierkegaard, see: VALCO, M.: Kierkegaard's 'Sickness unto Death' as a Resource in our Search for Personal Authenticity. *European J. of Science and Theology*, vol. 12, No. 1, 2016, 100-101. ISSN 1841-0464; for a contrasting approach, see: HAJKO, D.: Indian Philosophy at the Turn of the Millennium. *Filozofia,* vol. 69, No. 9, 794-795. ISSN 0046-385 X.

[3] KONDRLA, P., KRALIK, R.: Authentic Being and Moral Conscience. *European J. of Science and Theology*, vol. 12, No. 4, 2016, 155-164. ISSN 1841-0464.

[4] AUDEN, W. H.: *Selected Poems*. New York: Vintage Books, 2007. ISBN 978-0- 307-27808-1.

[5] AUDEN, W. H.: *The Living Thoughts of Kierkegaard*. New York: David McKay, 1999. ISBN 978-0-940-322.

[6] AUDEN, W. H.: *The Complete Works of W. H. Auden: Prose, vol. II: 1939-1948.* Mendelson, E. (ed.). Princeton: Princeton University Press, 2002, 109. ISBN 0-691-08935-3.

[7] KRALIK, R., TOROK, L.: Concept of Relationship God-man in Kierkegaard's Writing 'What We Learn from the Lilies in the Field and from the Birds of the Air.' *European J. of Science and Theology,* vol. 12, No. 2, 2016, 65-74. ISSN 1841-0464.

[8] MENDELSON, E.: *Later Auden*, New York: Farrar, Straus and Giroux, 1999. ISBN: 0-374-18408-9.

[9] REEVES, G.: *Auden and Religion*. The Cambridge Companion to W. H. Auden, Smith, S. (ed.), Cambridge: Cambridge University Press, 2004. ISBN 0 521 53647 2.

[10] Daniel Slivka points out an important hermeneutic principle in this regard: "The Bible itself gives us signs on how to find the original meanings hidden in it and how to use them in the present-day context." SLIVKA, D.: Hebraic scriptural hermeneutics in the ancient Hellenistic world. *European J. of Science and Theology,* vol. 11, No. 5, 2015, 87-96. ISSN 1841-0464. The Biblical quotation is from: *The Holy Bible, New King James Version*. Nashville: Nelson. 1982. ISBN 978-0840700537.

[11] AUDEN, W. H.: *The English Auden: Poems, Essays and Dramatic Writings 1927-1939*. Mendelson, E. (ed.). London: Faber and Fiber, 1977. ISBN:0571108326; Compare to: KONDRLA, P.: Apophatic theology, philosophy of dialogue and communication perspectives. *European J. of Science and Theology*, vol. 12, No. 1, 2016, 117-128. ISSN 1841-0464.

[12] AUDEN, W. H.: *Collected Poems,* Mendelson, E. (ed.) 2nd ed., New York: Random House, 1991. ISBN 978-0679731979.

[13] KRALIK, R.: Kierkegaard and his Influence on Tillich's Philosophy of Religion. *European J. of Science and Theology,* vol. 11, No. 3, 2015, 183-189. ISSN 1841-0464. For a recent appraisal of Tillich's theology, see: KRALIK, R.: Key Philosophical-Theological concepts of Soren Kierkegaard in the work of Paul Tillich. *J. of Science and Theology,* vol. 11, No. 4, 2015, 179-188. ISSN 841-0464.

[14] AUDEN, W. H.: *The Age of Anxiety: A Baroque Eclogue,* Princeton: Princeton University Press, 2011. ISBN 978-0-691-13815-13815-2.

[15] JURJEWICZ, H.: Mechanisms through which Spirituality Leads to Resilience for Immigrants. *European J. of Science and Theology,* vol. 12, No. 4, 2016, 17-25. ISSN 1841-0464.

[16] AUDEN, W. H.: *Forewords and Afterwards*, New York: Random House, 1973. ISBN 0-394-48359-6.

[17] AUDEN, W. H.: *A Certain World: A Commonplace Book.* New York : Viking, 1970. ISBN 978-0670209941.

[18] HECHT, A.: *Hidden Law - The Poetry of W. H. Auden.* Harvard : Harvard University Press, 1993. ISBN 0-674-3900-7.

[19] AUDEN, W. H.: *Collected Poems.* New York : Vintage Books, 1991. ISBN 978-0679731979.

[20] VALCO, M., KRALIK, R., BARRETT, L.: Moral Implications of Augustine`s Philosophical and Spiritual Journey in his Confessions. *Communications - Scientific Letters of the University of Zilina*, vol. 17, No. 2, 2015, 103-108. ISSN 1335-4205. On this question see also: HAJKO, D.: Wilmon Henry Sheldon and his "Synthesis of Philosophies" (in Slovak), *Filozofia*, vol. 71, No. 3, 2016, 209-219. ISSN 0046-385 X; VALCO, M.: The Roots and Nature of Luther's Theological Understanding of 'Missio Dei' in the Context of Reformation Agenda. *European J. of Science and Theology*, vol. 12, No. 4, 2016, 181-188. ISSN 1841-0464.

Dana Hanesova - Andrea Nelson - Ken Badley*

EDUCATORS IN SEARCH OF THE FINE LINE BETWEEN USE AND MISUSE OF NEW TECHNOLOGIES

The currently youngest generation of learners has been massively influenced by ubiquitous technology. Due to their developmental cognitive and moral immaturity, decisions about the intensity of their use of ICT lies on the shoulders of their educators who have grown up in a different, pre-globalized world. These adults are often not aware of their insufficiently substantiated approach to their use of ICT in teaching. To become sufficiently informed requires considering various viewpoints, ranging on a continuum from techno-sceptic to techno-utopian. Responsible decisions about the ethical use of ICT can be reached only after considering the issues of the power of ICT as well as the need of coherent research of young learners' needs and teachers' capabilities. The authors share the results of research in various countries. They propose some solutions to this ethical problem, ones they consider suited to reflexive education.

Keywords: *Technologies, education, use, ethics.*

1. Introduction

The benefits of modern technologies are indisputable. For the first time in human history people in any context can become educated via ubiquitous mobile learning.

Information and communication technologies (*ICT*) are the air the youngest generation (Gen Z) has been breathing since their birth. They are technically savvy and cannot live without the constant access to ICT. Seven-year-old children are comfortable navigating an I-pad, computer, or smart phone. An average 15-year-old child, coming from a country measured by OECD, "had at least 5 years of experience using computers" [1, p. 38]. Members of Gen Z illustrate perfectly the truism that "It's only technology if it happens after you were born" [2].

Teachers must recognize the specifics of Gen Z, get prepared for them and be aware of the demands that ICT make on their time, and their abilities. New ICT empowers teachers to "engage students, gather their opinions, measure ... and even detect plagiarism" [3, p. 47]. ICT have gradually changed all aspects of education [4]. One example is the substitution of printed textbooks by smartphone applications e.g. in Finnish and Dutch schools.

As is true of many inventions, regardless of the intentions of their inventors, the actual production process often ends up in the hands of companies aiming at maximizing their own profits [5], leading to overuse or misuse, e.g., of food or drugs. Even without the profit motive at work, technological developments lead to unintended end places, with atomic power as an extreme example.

The danger of lack of awareness that there is a potential misuse of new ICT is probably even greater due to the sensitivity of a child's being [6]. Though its immediate negative effects may be subtle, their influence may take on unpredictable proportions. For example, children who spend more than 6 hours daily online outside of school are twice more likely to experience loneliness than moderate Internet users [1].

Many questions arise when working with students and technology simultaneously. How should teachers introduce ICT in their classrooms in a way that promotes learning? What do their young students already know about ICT? What does too much ICT look like in the classroom? [7]

Educators vary in their opinions regarding ICT use due to their diverse background experience. For illustration, when comparing teachers' use of computer programs, teachers in Slovakia use ICT more to review the acquired knowledge, whereas in England they develop comprehension and creativity [8]. Finnish teachers regard digital competency as being so important as their ability to speak their mother tongue [9].

* [1]**Dana Hanesova,** [2]**Andrea Nelson,** [3]**Ken Badley**
[1]Faculty of Education, Matej Bel University, Banska Bystrica, Slovakia
[2]Humanities Department, Heppner High School, Heppner, USA
[3]Mount Royal University in Calgary, Canada
E-mail: dana.hanesova@umb.sk

Reflecting the response to the potential of ICT in education, there is a continuum of approaches to ICT from techno-sceptical to techno-utopian. Our aim is to evaluate both poles in the light of research and then to scrutinize them from an ethical perspective.

2. Techno-negative attitudes

Techno-sceptics are people who warn against the negative influences of ICT upon children. They encourage educators to think carefully before becoming overly enthusiastic about ICT in education. Although he is more curious than sceptical himself, Poster's work has figured in techno-scepticism [5]. On his account, humans perceive information differently when that information is mediated by a screen. By inquiring into how information is transformed by the means of its transmission and reception, Poster places himself in a long tradition of observers running back to McLuhan, Ellul and Postman, all of whom have sounded similar cautions about uncritical use of technology.

Techno-sceptics state that massive use of ICT alters children's brain development and the structure of their abilities to think and learn (e.g. to remember facts [10]) as well as behave. Children's multitasking is associated with an increase in their attention deficit disorders [11]. To the OECD report [1], the overall impact of schools' investment in ICT has had only limited, even negative effects on students' performance (e.g. in reading, mathematics, science, or teaching foreign languages via ICT-assisted drills). ICT did not help to bridge the cognitive differences between advantaged and disadvantaged students.

Techno-sceptics worry about negative effects of virtual social networks on children's real-life social skills (e.g. to control and communicate emotions, solve real problems, find a partner, or prepare for a job [12]). A research into students' opinions showed their need for more human interaction during e-learning studies [13]. Researchers point also at a more frequent emergence of stress, insomnia, passivity, obesity or depression in children overusing ICT, and thus resulting in lowering their physical abilities and health condition [14 and 15].

The most radical techno-sceptics perceive high ICT use at a young age as the cause of permanent damage in children's lives. Based on international research, Spitzer [14] believes digital media actually lead to *digital dementia* (the term coined by Koreans [16]); decrease of children's spontaneity and creativity; and increase of technology addictions and of suicidal inclinations. He pleads for total exclusion of these media to 18 years of age in schools.

Not all techno-sceptics are so radical. Usually, in their blogs, they fight for more careful methodological considerations of ICT during lessons planning, and their evaluation. They ask ethical questions about the motives of ICT production and its research in schools.

Most of the mentioned studies were published when Gen Z was only beginning to be immersed in ICT as pupils. Though thousands of current studies indicate a relatively low influence of ICT in a traditional learning context, Hattie [17 and 18] expects increasing impact of ICT on the construction of knowledge via activating learning activities. As it is impossible to comprehend all impacts of new ICT on humans yet [19 and 20], only future research will show if negative findings continue to represent the realities of learning with ICT.

3. Techno-positive attitudes

Though being aware of the dangers of overwhelming digital power, techno-optimists see predominantly positive outcomes from ICT in education. Since the industrial revolution techno-utopians have envisioned a world where machines removed the need for humans to work. Interestingly, the techno-dystopians have described their technological nightmares for about the same length of time. Where the poet, W. Blake, saw "Satanic mills" in his 1808 poem, "Jerusalem," others see a bright human future, made more humane by technology [21 and 22]. Nowadays many schools have high expectations from ICT [1].

Techno-utopians engage some techno-sceptics' arguments. For example, O'Gorman challenges the concept of *digital dementia* in connection with memory decrease due to heavy use of ICT and with the way of its diagnosis (primarily via self-reporting) [19]. He argues against the idea of its irreversibility, pointing at a potential for brain improvement as in cases of addiction. Instead of rote learning and focusing on the deterioration of lower-order thinking skill of storing/recalling information [23], techno-optimists are enthused over the positive influence of ICT on learning in a constructive way [24]. Research among Korean and Taiwanese teenaged students shows the increase of their motivation, higher thinking skills, and reduction of teachers' workload due to context-aware ubiquitous learning [15, 25, 23].

Another way how to positively process techno-sceptic data on alteration of the human mind under the influence of ICT is the techno-progressive stance, welcoming the symbiosis of technological and societal changes [26], and asking why not to perceive the 'digitally demented' brain structure as a stage in the process of brain enhancement. Of course, strong societies can be built only if ICT is used in just ways that benefit all members of that society.

Discussing the impact of the Internet on Gen Z' health, it has evidently become a source of information on a healthy lifestyle. Watching online sports broadcasts, e.g. of the Tour de France by Slovak youth, has had a real stimulating effect on their cycling activity. The recent phenomenon of getting children into outdoor physical movements in their search for a Pokémon is just one example of the necessity to find a proper balance in the use of technology.

Most technophiles are aware of the necessity of thorough objective research of ICT influence [27], as well as of the requirements (such as adequate time, balance between ICT and teaching methods) of successful ICT implementation, attaining improvement of students' learning experience, or deep reading skills [28, 29 and 30].

4. Ethical reflections

The mere existence of ICT does not present an ethical problem. It arises when asking: Who owns ICT? Who has the right to use them in children's lives? Why? To what extent? Every question in human life can be framed ethically even though it may focus primarily on another dimension. In that sense, educational uses of ICT are no different from other areas of human activity. Belar appeals to educators using ICT to consider its ethics [4]. Taking that advice, we consider it important that teachers consider seriously the ethical issues connected with ICT before their use in the classroom. They should be granted enough time for well-informed preparation, ethical self-reflection and critical thinking.

The core of the ethical question about the level of intensity and content provided by ICT in schools is the matter of responsibility for the holistic development of each child. Schultz ascribes the existence of an ethical problem to situations where there is a tension between the interests of various parties. The question is "which highest principle gives value to technologies" [31, p. 16]. Schultz associates ethics with the value of things, "providing each person with chances" [6, p. 348]. As values in cyber space are communicated via new forms of networking, humankind has found itself in the state of "educational twilight, as there is no new educational model adequate for the new era so far" [32, p. 257].

Educators have to realize that the following points must be treated as ethical questions:

The issue of power of technologies, of ICT producers and ICT owners. It lies in ICT forcing people "to reside in the cyberspace influencing their thinking, images and doing" whether they want or not [33, p. 257]. So either we can use our technologies or our technologies can use us [34].

The priority of children's needs for safe learning environments. Being in the development stage of concrete thinking, or just beginning to think analytically, children are not able of ethical reasoning to choose appropriate ICT, or to anticipate its dangers or benefits [35].

Character of research on ICT: Due to neoliberal pressures, research agencies are often controlled by performative or economic motives [36]. Of course, a few organizations have put significant effort into finding an objective impact of ICT on students.

Insufficient ethical preparation of teachers: In our survey, only 17 out of 4000 current studies deal with teachers' motives, attitudes, or values. Ethical dilemmas of ICT use are vastly neglected both in research and teacher education. Teachers should become aware of their motives to use ICT. Either they focus on the students' needs by preparing enjoyable, resourceful lessons or they are driven by personal professional, financial interests. Some teachers use ICT for its convenience, or out of fear of losing popularity among students, or by being pushed to use it by their authorities, and stressed out by its demands.

5. Recommendations and conclusion

Our aim was to highlight the importance of research and ethics of ICT use in the classroom, especially its impact on student's performance. According to OECD, education systems could "do more to improve the effectiveness of their investment into ICT by being both gradually accepting and sceptical" to ICT [1, p. 191].

In our classrooms we have encountered struggles finding the right balance between ICT use and traditional teaching methods. However, this new struggle is not that different from the struggles encountered by educators during paradigm shifts in education. Contemporary technologies are tools, similar to other educational tools, such as writing or textbooks. Every new technology, upon its introduction, engenders fears. We included writing just above because Plato addressed it in *The Phaedrus* over 2300 years ago, noting the fear expressed by some that people would forget how to remember if they could write things down. Humans have incorporated many new technologies since the development of writing, and each time that process of incorporation required negotiating a space between old and new.

Some teachers struggle to find a balance between bookwork and student-to-student engagement. Similarly, teachers, administrators and parents must find the right balance when using ICT. This takes a commitment from all stakeholders that they will reflect on their student growth goals and how ICT supports student learning. Too often assumptions are made that ICT will solve educational road blocks, when in reality it takes a community of student-focused individuals working together and using whatever tools are available to help their students succeed both academically and socially.

Also there is a need to put all effort into ensuring "that teachers have models of ICT use that correspond with each teacher's educational beliefs" [8, p.11]. To turn this vision into reality requires paying attention to high-quality teacher education and to building teacher professional communities, based on constructive discussions, regular tutoring, sufficient hands-on experience, and feedback.

We believe that–used correctly–ICT has the potential for good in schools. And, the corollary, used wrongly it can do harm.

Some abused the new technologies while others used them for human flourishing. So this is why we call on educators, and on policy-makers to engage in careful ethical reflection before adopting new educational technologies.

References

[1] OECD. *Students, Computers and Learning: Making the Connection.* PISA : OECD, 2015. http:/dx.doi.org/10.17878/978926423955-en.

[2] LEVINE, A., DEAN, D. R.: It's only Technology if it Happens after You were Born, *J. of College Admission,* Summer 2013, 6-12. ISSN 0734-6670. http://files.eric.ed.gov/fulltext/EJ1011798.pdf.

[3] HART, A., HART, F. S.: *The Digital Invasion*. Grand Rapids: Baker Books, 2013. ISBN 978-0801015298.

[4] BELAR, C.: Technology and Education. *Monitor on Psychology*, vol. 43, No. 4, 2012, 75. ISSN 1529-4978.

[5] POSTER, M.: *Information Please: Culture and Politics in the Age of Digital Machines.* Durham, NC: Duke, 2006. ISBN 978-0822338390.

[6] KELLY, K.: *What Technology Wants*. New York: Viking Penguin Group, 2010. ISBN 978-0-670-02215-1.

[7] COMBS, L. B., CENNAMO, K. S., NEWBILL, P. L.: Developing Critical and Creative Thinkers. *Educational Technology,* vol. 49, No. 5, 2009, 3-14. ISSN 0013-1962.

[8] LEEDER, G. P.: *Computer Programs in Teaching at Secondary Schools* (in Slovak), Final Thesis, Ruzomberok: KU, 2015.

[9] PAASO, A., KORENTO, K.: *The Competent Teacher 2010-2020,* Tampere: FNBE, 2010. ISBN 978-952-13-4436-7.

[10] SMALL, G., VORGAN, G.: *i-Brain: Surviving the Technological Alteration of the Modern Mind,* New York: Harper, 2009. ISBN 978-0061340345.

[11] PALMER, S.: *Toxic Childhood: How the Modern World is Damaging our Children and what we can do about it.* London: Orion House, 2006. ISBN 9781409158714.

[12] PATRICK, A.: An Apple a Day Keeps Attention Away. *The Technoskeptic,* 20/04/2016. https://thetechnoskeptic.com/apple-a-day/

[13] SULTANY, A., HALFORD, S.: *Using a Techno-scepticism Framework to Evaluate the Perception and Acceptance of a New Online Reading,* IADIS Intern. Conference e-Learning 2013, London: City University, 2013, 107-117. ISBN 978-972-8939-88-5. http://files.eric.ed.gov/fulltext/ED562300.pdf

[14] SPITZER, M.*: Digital Dementia,* Brno : Host, 2014. ISBN 978-80-7294-872-7.

[15] ZOLLINGER-READ, P.: How Technology and Inactive Lifestyles Are Changing Our Children. *The Guardian,* 30/08/2013. ISSN 0261-3077. https://www.theguardian.com/sustainable-business/technology-inactive-lifestyle-changing-children

[16] PARK, CHUNG-A.: Digital Dementia Troubles Young Generation, *Korea Times*, 08/06/2007. ISSN 1063-6412. http://www.koreatimes.co.kr/www/news/nation/2008/04/117_4432.html

[17] HATTIE, J.: *Visible Learning,* London : Routledge, 2009. ISBN 978-0415476188.

[18] HATTIE, J.: *Ranking - Interactive Visualization,* 2015. http://visible-learning.org/nvd3/visualize/hattie-ranking-interactive-2009-2011-2015.html

[19] O'GORMAN, M.: Taking Care of Digital Dementia, *Ctheory.net,* 18/02/2015. http://www.ctheory.net/articles.aspx?id=740

[20] WILLS, D.: *Dorsality: Thinking Back through Technology and Politics,* Minneapolis : UMP, 2008. ISBN 978-0816653461.

[21] GATES, B.: *The Road Ahead,* New York : Viking, 1995. ISBN 978-0670859139.

[22] KIM, J.: Techno-Skeptics and Techno-Utopians. 09/03/2014. *Inside Higher Ed.* https://www.insidehighered.com/blogs/technology-and-learning/techno-skeptics-and-techno-utopians

[23] ANDERSON, L. W., KRATHWOHL, D. R. (Eds*.): A Taxonomy for Learning, Teaching, and Assessing,* Boston : Allyn & Bacon, 2001. ISBN 978-0801319037.

[24] MUNZENMAIER, C., RUBIN, N.: *Bloom's Taxonomy: What's old in new Again,* Santa Rosa : The eLearning Guild, 2013. http://educationalelearningresources.yolasite. com/resources/guildresearch_blooms2013%20(1).pdf

[25] SHIH, J., CHU, H., HWANG, G.: An Investigation of Attitudes of Students and Teachers about Participating in a Context-aware Ubiquitous Learning Activity, *British J. of Educational Technology,* vol. 42, No. 3, 2011, 373-394. ISSN 1467-8535. DOI: 10.1111/j.1467-8535.2009.01020.x.

[26] *Technoprogressive Declaration - Transvision 2014,* Institute for Ethics and Emerging Technologies, 22/11/2014, http://ieet.org/index.php/IEET/more/tpdec2014.

[27] KIRKWOOD, A., PRICE, A. Examining Some Assumptions and Limitations of Research on the Effects of Emerging Technologies, *British J. of Educational Technology,* vol. 44, No. 4, 2013, 536-543. ISSN 1467-8535. DOI**:** 10.1111/bjet.12049.

[28] SAUNDERS, F. C., GALE, A. W.: Digital or Didactic: Using Learning Technology to Confront the Challenge of Large Cohort Teaching. *British J. of Educational Technology*, vol. 43, No. 6, 2012, 847-858. ISSN 1467-8535. DOI: 10.1111/j.1467-8535.2011.01250.x.

[29] RICHARDSON, J., WOLF, M.: Balance Technology and Deep Reading to Create Biliterate Children, *Phi Delta Kappan,* vol. 96, No. 3, 2014, 14-19. ISSN 1940-6487.

[30] OECD: *Education at a Glance 2015: OECD Indictors*. ISBN 9789264242098. http:/dx.doi.org/10.1787/eag-2015-en.

[31] SCHULTZ, R. A.: *Contemporary Issues in Ethics and Information Technology,* London : IRM Press, 2006. ISBN 1-59140-780-X.

[32] GALIK, S.: Current Issues of Educational Theory and Practice. In *Contexts of Philosophy of Education in Modern Times and Contemporary Perspective.* Kudlacova, B., Rajsky, A. (eds.) Trnava : PF TU, 2014, 250-258. ISBN. 9788080827724. See more: GOGORA, A.: Actor-network Theory and the Concept of Translation (in Slovak), *Filosofia,* vol. 68, No. 9, 800-811. ISSN 0046-385X.

[33] OPPENHEIMER, R.: The Computer Delusion, *Atlantic Monthly,* vol. 280, No. 1, July 1997. ISSN 1072-7825. http://www.theatlantic.com/magazine/archive/1997/07/the-computer-delusion/376899/.

[34] POSTMAN, N.: *Technopoly: The Surrender of Culture to Technology,* New York : Knopf, 1992. ISBN 9780394582726.

[35] KOHLBERG, L.: Conscience as Principled Responsibility, Zecha, G., Weingartner, P. (eds.). *Conscience: An Interdisciplinary View,* Dordrecht : Riedel Publ. Comp., 1987, 3-15. ISBN 978-94-009-3821. Compare to: JUROVA, J.: On Etzioni's Concept of a Responsive Community. *European J. of Science and Theology,* vol. 12, No. 3, 2016, 71-80. ISSN 1841-0464 and KONDRLA, P., KRALIK, R: Authentic Being and Moral Conscience. *European J. of Science and Theology*, vol. 12, No. 4, 2016, 155-164. ISSN 1841-0464. For more on this topic, see also: VALCOVA, K., PAVLIKOVA, M., ROUBALOVA, M.: Religious Existentialism as a Countermeasure to Moralistic Therapeutic Deism, *Communications - Scientific Letters of the University of Zilina*, vol. 18, No. 3, 2016, 98-104. ISSN 1335-4205. VALCO, M., KRALIK, R., BARRETT, L.: Moral Implications of Augustine's Philosophical and Spiritual Journey in his Confessiones. In: *Communications - Scientific Letters of the University of Zilina*, vol. 17, No. 2, 2015, 103-108. ISSN 1335-4205.

[36] AFEMANN, U.: Having a Laptop does not mean Education (in Germany), *The European (Das Debaten-Magazin),* 12/04/2011. http://www.theeuropean.de/uwe-afemann/6335-ikt-in-der-entwicklungszusammenarbeit.

Annamaria Konyova*

POSITION OF NATURAL SCIENCES IN THE EDUCATION OF REFORMED HIGHER SCHOOLS IN THE HUNGARIAN KINGDOM IN EARLY MODERN AGE (ON EXAMPLE OF REFORMED COLLEGIUM IN SAROSPATAK)

The Reformation, being one of the most significant streams of thought in the early modern age, was closely associated with considerable changes exhibited in various facets of life, also in the education. Transformation of schools to Protestant ones had a significant effect on the curriculum to some extent also in the use of innovative methods in education. The aim of this study is to show an important attribute of Reformed education, which started in early modern ages in the areas of Upper Hungary and manifested itself by strengthening the status of natural sciences in curriculum. The article focuses on a number of related problems. In the first place, I focus on a time horizon for implementing individual natural science courses in Reformed schools and their status amongst other courses. In addition, I pay attention to the research of the teaching method that was used at the time, the use of new methods, teaching aids, and mention the distinguished personalities that were essential during the process of development and implementation of these courses in schools, as well as other partial issues related to this.

Keywords: *Protestantism, education, natural sciences, curriculum, teaching methods, Hungarian Kingdom.*

1. Introduction

The Reformation, being one of the most significant streams of thought in the early modern age, was closely associated with considerable changes exhibited in various facets of life, and its consequences are observable to this day. With the exception of many changes that occurred in religious and spiritual life of the society, the far-reaching effect of the Reformation spread to education, its curriculum and, overall, with respect to the question of knowledge in society. Protestant reformers realized that schools and their educational function were essential in enhancing a more thorough understanding of faith with a view to upholding a deeper anchorage of faith in religious people. The changes that occurred in education at the time were reflected at two levels.

Firstly, Protestantism viewed the role of schools and the relationship between education and society differently from then on. A majority of reformers were not averse to the idea that a good and religious Christian was not compatible with education. In fact, they realized the significance that schools and learnedness both had in the strengthening and deepening of faith. In protestant theory and practice of education, schools were turning to be perceived as "imaginary gates or church halls" the primary role of which was education of not only the good but also the religious who were educated.

Secondly, Protestantism brought a new perspective on curriculum and the relationship between education and academic knowledge. In general, the medieval system of education that ranged from parish schools to universities put theology on top of educational priorities. Not only was theology the highest science but at the same time it defined the boundaries of academic research or other sciences. All the knowledge that was outside of the static understanding of the world, the knowledge that was going over the boundaries of medieval theology and its interpretation of universe was understood to be dangerous, often heretical and deplorable. Such an environment was not open to natural sciences the discoveries of which were understood as a disruption of the leadership assumed by theology and its interpretation of world order. Along with a frequently emphasized philosophy of humanism, there was also another philosophical stance, however very often left forgotten or ignored, that had a considerable significance on the change of perception of natural sciences and their status in educational system.

Calvinism under the influence of its founder John Calvin brought new perspectives on natural sciences to Protestantism.

* **Annamaria Konyova**
Institute of History, Faculty of Arts, University of Presov, Slovakia
E-mail: annamaria.konyova@unipo.sk

Although it is generally assumed that John Calvin had a difficult personality and was inapproachable, he showed he was capable of innovative thinking in many respects. According to his biographer Elister McGrath, Calvin expressed his attitude about questions regarding natural sciences in his work Institutes of the Christian Religion (1559). The reformer´s opinions are based on his elementary theological theses, i.e. the teaching about predestination and his understanding of the absolute sovereignty of God. Just like the entire fate of a human being, as well as the whole of universe, the world is determined from the beginning by the omniscience of God. Laws of nature subdue to His power and will and the universe has been created according to this as well as individual human beings since they are part of nature. For this reason, the unearthing of these laws, the exploration of macrocosm and microcosm and its order is nothing else but a deeper exploration of God and His power. Therefore, what follows form this is the second fundamental statement, i.e. there is not and should not be any barriers that would set out the possibilities of human knowledge. *"Calvin by virtue gave to knowledge a religious perspective and with a religious reasoning he supported sciences to start researching and learn about nature"* [1, p. 271]

Calvin´s second fundamental achievement with respect to natural sciences was his refusal of a verbatim interpretation of the Bible. According to him, when conducting academic research, it is not possible to follow the Bible word by word or to understand it as a textbook of natural sciences. The Bible is the mediation of the life of Jesus Christ, it is the work about him and for this reason, it gives answers to questions about faith and religion, and not answers to questions about internal behaviour and laws of the world [1]. According to Calvin, God became man in all respects to have a better understanding of his mental and visual abilities. In this sense, the content of the Bible is simplified, including the interpretation of the creation of God and its functioning, and tailored exactly to the extent that man is capable to understand it. Due to this, the role of natural sciences is to discover such real natural laws and unearth a more difficult structure of the world. According to McGrath, Calvin´s ideas were the ones that predominantly in the western countries influenced the development of thought in the 17th century. The significance of Calvinism or Calvin himself on its later development overestimate, however, it is important to admit that his ideas were one out of many other stimuli for a more dynamic development of natural sciences.

The Hungarian Kingdom belonged to the countries, which were dramatically affected by the reformation process with all its consequences. A wide acceptation of the Reformation ideas caused that a majority of people (90%) in the country had turned Protestant (Lutheran or Calvinist) by the end of the 16th century. The new confessional situation in the country required changes in many areas of life, among others also in education. As mentioned above, Protestantism strengthened the relationship between school and church. Schools did not serve only as advocates of strengthening a religious confession through education of wide masses of people, in fact, a more important role of predominantly higher schools was the education of ensuing generations of learned young priests or intelligentsia that served as a firm support to the Protestant churches that were formed at the time. The Protestant schools were established either by transformation of Catholic schools or by secular patrons (town magistrates or secular landowners) who were founding and maintaining them brand new. In the majority of church congregations, be it in villages or towns, little towns according to a dominating Protestant faith (Lutheran or Calvin), elementary schools were founded with a view to provide an adoption of elementary skills, i.e. reading, writing, counting and catechism. In more prominent towns, either larger landowning towns or free royal towns, schools of higher importance were established (grammar schools) [2] that were providing higher education that served as a preparation for university studies abroad [3].

Transformation of schools to Protestant ones had a significant effect on the curriculum to some extent also in the use of innovative methods in education. The aim of this study is to show an important attribute of Protestant education, which started in early modern ages in the areas of Upper Hungary and manifested itself by strengthening the status of natural sciences in curriculum. The article focuses on a number of related problems. In the first place, I focus on a time horizon for implementing individual natural science courses in Reformed schools and their status amongst other courses. In addition, I pay attention to the research of the teaching method that was used at the time, the use of new methods, teaching aids, and mention the distinguished personalities that were essential during the process of development and implementation of these courses in schools, as well as other partial issues related to this.

The topic has already been tackled by an older Hungarian historiography, however it stayed outside of focus of Slovakian researchers, be it historians, teachers or church historians. The backdrop for this study draws on research articles written by researchers from home and abroad, this is completed by new archive materials such as school regulations, register of collections of school artifacts, natural science textbooks etc. As there was an extensive network of higher Protestant schools with a rich history and a large amount of materials in the Hungarian Kingdom, I primarily zone in on the Reformed Collegium in Sarospatak (HU).

2. Reformed Collegium in Sarospatak

According to tradition, the Protestant school in Sarospatak was founded in 1531 and continued the work that a previous parish school had begun [4]. The establishment of the school in the first period of its existence was under the Perényi dynasty. After the

dynasty´s rule ended, the school was under the patronage of the Rákóczi dynasty. Owing primarily to their support, the school gained importance and became the bulwark of Protestantism, more precisely, Calvinist church on the territory of the Upper Hungarian Kingdom. During its existence, many distinguished reformers, scholars of the times worked at the school, and owing to their activities, the school quickly transformed itself to a higher education institution in which, except for seven free arts, theology was taught in higher grades. Many of the students who graduated from the school went on to pursue university studies abroad and upon their return, they continued to work for the school as teachers. Owing to such peregrination, new thought-provoking ideas came to Sarospatak, along with the latest knowledge and discoveries in various sciences [5, p. 75-79].

The Reformed school in Sarospatak was at its peak in the first half of the 17th century when Jan Amos Komensky, a distinguished education theory scholar, worked and implemented his educational theory [6, p. 151]. It is from this period, viz. from 1621, that the first well-preserved school regulations document comes from. It stipulates the duties of the individual school officials, it specifies the entire teaching process, and it covers all areas of student life, it sets out punishments and penalties. The Article 11 mentions that the taught courses were theology, philosophy, Latin language, Greek language, useful Latin features, poetics, rhetoric and logic [7, p. 25], however, natural sciences were not mentioned. It is understood that in accordance with the custom of that period it is permissible to assume that the basics of natural sciences were taught as well, however they were part of philosophy courses. An important quality of Protestant schools was autonomy in school administration as well as in the teaching process that included teaching methods and curricula. Schools or individual teachers, hence, decided what to study, how to study. Such academic freedom enabled a quicker implementation of new knowledge, particularly in natural sciences, to the teaching process in Protestant schools.

With regard to curriculum, the Reformed Collegium in Sarospatak, as well as all other types of such schools, provided classic education based on philosophy, theology and languages. As mentioned above, as part of schooling, students were acquainted with the basics of natural sciences. The knowledge from mathematics, astronomy and geometry were part of philosophy. Similarly, physics was not taught separately, despite this, physics was notable for the most innovations in the teaching process. During the entire 17th century, the Collegium in Sarospatak hosted professors who significantly contributed to the separation of physics and helped it become a teaching course of its own. The first important step to achieve this was taken when a first textbook about natural sciences that was published at home (*Phisophiae Naturalis. Sive Introductio in theatrum naturae, 1667)* by Janos Posahazi [8]. During his abroad trips to England, Germany, he learned about new scientific theories that he spread on when he returned home. Pósaházi and his successors refused to teach physics using the traditional method according to the Aristotelian physics and tried to spread novel theories (particularly Galilei, Newton). They were also the proponents of the teaching method that was based on experience and examples rather than on philosophical and theoretical approach.

The most important breakthrough in teaching physics not only in Sarospatak but generally in the entire Kingdom of Hungary was the teaching tenure of professor István Simándi. When he returned from his studies abroad in 1707, he accepted the position of professor at Sarospatak where he persuaded the principal of the school about a need to innovate teaching physics by using demonstration, making observations and experiments. He was the first professor to start teaching experimental physics (Physica experimentalis) using physical aids, and making various experiments. Unfortunately, the exact content of the course, or what was taught in experimental physics, remains unknown due to insufficient number of preserved artefacts. The School Council was open minded with regard to Simándi´s idea, and approved the financial aid of 800 Rhenish gold coins to purchase teaching aids for a course in physics from abroad. Upon his return in 1708 Simandi brought 57 aids (items) to help him teach physics, which became the basis for a physical collection, and which is nowadays part of the school´s museum in Sarospatak. The most precious and most interesting items of the Simándi Collection, among others, is a vacuum cleaner manufactured in Leyden, with the help of which it was possible to make various experiments that required a vacuum; or an optical device laterna magica; or a machine that was able to set exact time Horodictum meridionale [9, p. 274-277]. It is interesting to note that Simandi´s activities, besides being welcome by one group of people, they were viewed negatively by others to the extent he was accused of carrying out black magic due to the physical experiments he was conducting with his machines. His prolific work in physics was discontinued due to his death from plague in 1710 [8].

The importance of István Simándi did not lie in his being the first professor who implemented a novel teaching method of physics or in his establishing the collection, but especially in the fact that he inspired his successors to continue and develop his work on teaching natural sciences. Professor Marton Szilagyi made in 1774 a list of all aids and items that were used in the course of teaching physics to students at that time, also it shows information lesson plans and topics presented to students. During the past seventy years, the collection has been amassed by other 132 items, which were divided in the list according to branches of physics into machines: Mechanica, Hydrostatica, Hydraulica, Aerometrica, Optica, Astronomica et Geographica, Magnetica et Electrica, Expansionis Corporum ab Igne et Calore. This classification shows a very advanced level of teaching physics as well as a vast knowledge offered based on newest European scientific results. What is missing from the list is a separate section for acoustic courses, which are classified together with what is known as aerometric courses since at the time the

knowledge and phenomena related to sound were observable in air or gas. In addition, it is interesting to note that magnetic and electric items on the list were included in the following category of items Instrumenta Subtilium Effluviorum because physics at the time recognized magnetic and electric phenomena to be immaterial liquids dissolved in matter [10, p. 456-468].

The 18th century also saw an important progress in other natural sciences, especially in chemistry. This had an impact on the Reformed Collegium in Sarospatak in the sense that the school included thirty chemicals and chemical machines in the collection. The items related to natural sciences in the school were growing. The school acquired telescopes, microscopes, geographical globes, which served as proof that the school did not want to lag behind with respect to astronomy, biology, and geography, and that, in fact, the school wanted to stay on par with the progress that European and world science had been experiencing at the time. Professor Mozes Kezy (1781-1831), who since 1813 had been professor of mathematics and physics, further completed the collection. During the years that he spent in the school, he enriched the collection by his own constructions of many machines, e.g. electric machine or he had local tradesmen who would manufacture items for him [10, p. 456-468].

Textbooks and academic articles written by professors who were teaching natural sciences document the high quality of natural science items, except the items used in teaching. A majority of articles were written in Latin but research articles and textbooks written in Hungarian were becoming more frequent since the end of 18th century. The first natural science textbook was written by Janos Posahazi *Natural Philosophy* (*Philosophia Naturalis*, 1667). In the following centuries, the number of natural science works was increasing, e.g. professor Istvan Emody´s textbook (1770-1823) *Natural history I.* (*Termeszeti historia I.*) written in 1809 (2nd edition in 1818), in which he outlined animals, classification of animals, and includes at the end of the textbook their Latin, Hungarian and German forms. The continuation of his work was the textbook written by Jozsef Vadnay *The Natural History II. Plants* (*Termeszeti Historia.* A *plantak orszaga*) published in 1811 and the textbook written by József Gelei *The Natural History III. Minerals* (*Termaszeti historia III. Az asvanyok orszaga*) published in Sarospatak in 1818, too. The abovementioned Mozes Kezy wrote in 1818 *The Basics of Physics* (*Elementa physicae. In usum praelectionum suarum*) for the purpose of teaching physics, and he later published the work *Short Outline of Physics* in Hungarian (1830), *Basic Algebra* (*Elementa algebrae*) in 1830 and *Basics of Pure Geometry* (*Elementa geometriae purea*) in 1831.

Mathematics was significantly developing the Reformed Collegium as well, although it cannot be considered as a natural science to full extent, rather it is "the language of natural sciences", in the period that is under scrutiny in this article, it belonged to the group of the so-called real courses. Mathematics was the first to start making an effort to be independent from natural philosophy within the terms of a teaching context and it was becoming a separate course. Mathematics was from the beginning of 19th century studied in each year and was completed with algebra, space geometry. The largest credit on the development of mathematics at the Reformed Collegium in Sarospatak is attributed in fact to the first professor of mathematics Pal Sipos (1759-1816) [8]. As recognition of his scholarly work, as well as for his discovery of the so-called isometric curve in geometry, he was recognized abroad, and the Royal Scientific Academy in Berlin awarded him a gold medal in 1795 [11].

Geography took a similar path in terms of its development. It had been lectured since 17th century, however, it began to exist as a separate course in 1786 when it started to be taught from first to seventh grade and since 1804 to the ninth grade [12, p. 103-104].

3. Conclusion

The previous outline of natural sciences at the mentioned Reformed school shows the important positions of natural sciences in the education. Nearly no school agendas of reformed schools from the period of 16th– 18th centuries, which could give the better quantity overview of the number of natural science subjects and their more exact determination, were remained, however, on the other hand, there are some resources (textbooks, collections, teaching aids) that clearly show the fact that they played rather important role in the teaching process. In spite of the fact that natural science subjects made the smaller part of the total number of subjects taught in Calvinist schools up to 19th century, they were able to reach very high (also European) level. The activity of professors in the Reformed Collegiums in Sarospatak shows that these schools were opened for new scientific impulses in the field of natural sciences. They kept not only intensive contacts with European scientific environment but also implemented new inventions and theories in their lectures very soon. Besides the innovation of individual natural science subjects' contents, teachers showed the interest in new ways of teaching based on demonstration, experiment, and use of "modern" teaching aids as early as the 17th century.

There are several reasons of the stronger position of natural sciences in Calvinist schools. One of the factors is the character of Calvinist theology itself and in the preface mentioned ideas of its founder John Calvin on the relationship of religion and science (natural sciences). Since its beginning, Calvinism created "freer" intellectual environment which was friendly to more positive relationship to new discoveries and scientific theories. Professors at Calvinist schools had more autonomous position within the process of teaching, and therefore they could set the contents of their lectures more independently. The important factor could be the fact, that especially during the 17th century the important scientific and pedagogical personalities acted in both schools. Thanks to their activity, they generated their followers who continued with the development of natural sciences.

References

[1] McGRATH, E. A: *Calvin* (in Hungary), Budapest: Osiris kiado, 1996, ISBN 963 379 137 5.

[2] REZIK, J., MATHEIDES, S.: *Gymnazilogia. The History of Grammar Schools in Slovakia* (in Slovak*),* Bratislava: Slovenske pedagogicke nakladatelstvo, 1971. To more important evangelic schools in the area of what is today known as eastern Slovakia belonged schools in Presov, Bardejov, Kosice, Sabinov, Strazky, Markusovce, Spissky Hrhov etc. More important reformed schools were established in Secovce, Kosice, Humenne, Kralovsky Chlmec, Sarospatak. Within the entire Hungarian Empire, Collegiums in Debrecen and Pap were of a great importance.

[3] *The history of Hungarian Protestant Church* (in Hungary*),* Mihaly Zsilinszky (ed.), Budapest: Atheneum irodalmi es nyomdai r-k tarsasag, 1907.

[4] *The Reformed Collegium in Sarospatak* (in Hungary)*,* Sarospatak: Budapest: A Reformatus zsinati iroda sajtosztlya, 1981.

[5] KONYOVA, A., KONYA, P.: *Calvinist Reformation and the Reformed Church in Estern Slovakia During 16th - 18th Century* (in Hungary)*,* Presov: Vydavatelstvo Presovskej univerzity, 2010, ISBN 978-80-555-0179-6

[6] KOMLOSI, S.: *Zsuzsanna Lorantffy´s Activities Supporting School Education* (in Hungary). Erdely es Patak fejedelemasszonya Lorantffy Zsuzsanna I, Tamas Edit (ed.), Sarospatak: Sarospataki Rakoczi muzeum, 2000, ISSN 0487-3890

[7] *The Orders from 1618 and School Laws from 1620 of Collegium in Sarospatak* (in Hungary), Szentimrei Mihaly (ed.), Sarospatak: Sarospataki Reformatus Kolegium Tudomanyos Gyujtemenyei, 1996, ISBN 963 04 6452 7.

[8] SZINNYEI, J.: *Life and Works of Hungarian Writers I-XIV* (in Hungary), Budapest: Hornyaszky Viktor konyvnyomdaja, 1891-1914.

[9] BIGUS, I.: 300 Years old Teaching of Experimental Phisic in Sarospatak (in Hungary). *Fizikai szemle*, 2011, 7-8, p. 272-277.

[10] ELLEND, J.: Two Hundred Year old Past of College in Sarospatak (in Hungary). *Magyar Pedagogia*, 1889, 456-468.

[11] WESZELY, T.: Pal Sipos, the First Hungarian Gold Medail Teacher of Mathematics (in Hungary), *Termeszettudomanyok vilaga*, vol. CXXVI, No. 5, 1995, 207-209.

[12] UGRAI, J.: Changes in Reformed Collegium in Sarospatak in the Period of Enlightment (in Hungary). *Egyhaztorteneti Szemle*, 2001, II/1, 94-111.

Daniel Slivka - Janusz Mierzwa*

INTENTIONAL ABUSE OF SOCIAL NETWORKS WITH THE GOAL OF PROMOTING IDEAS OF ANTI-SEMITISM, RACISM, AND XENOPHOBIA

This scientific study points out a relatively common negative occurrence in the Slovak society as well as in Europe in general. Various parties, associations and movements, most notably on the extreme right side of the spectrum, use virtual social networks to promote their ideals and to reach their goals in the society. Social networks often contain hidden and manipulative forms of promoting ideas of anti-Semitism, racism, and xenophobia.

Keywords: *Social networks, manipulation, communication, extreme right, anti-Semitism, racism, xenophobia.*

1. Manipulative Methods and Their Effects on Social Networks

There are many techniques of manipulation which enable certain persons to gain influence on people and their thinking, while these people remain utterly unaware of it. There are many possible methods to do this, the following being the most frequent ones [1]:

- "The spiral of silence" – this theory was brought by E. Noelle-Neumann who discovered that many people are rather silent at their first encounter with information as they fear of being pushed to the margin of the society and that they would have to face the pressure of the society. They prefer to remain silent, accepting the opinions of others [2, pp. 22-23].
- "The third-person effect" – people generally tend to overestimate the effect of media and the Internet on others, but they underestimate the effect on themselves (they think that it cannot happen to them) [3]. As recipients, they think that they are absolutely resistant to the phenomenon of manipulation. The social networks use this as a moment of surprise – a moment when human individuals do not expect manipulation targeted on their personality [4]. The phenomenon is known as the third-person effect which is rooted in the natural thinking of humans who believe that "others are worse than themselves". The term "others" refers to the third person who is constantly manipulated, while remaining unaware of it, but it is frequently myself who is manipulated. In short, I do not believe that it could be me who is influenced by manipulation [1].
- "The hidden persuasion" – is the most dangerous method of manipulation in information technologies. The danger is rooted in the fact that it cannot be so simply recognized. The term refers to journalists as to "hidden persuaders". The fundamental principle of the phenomenon rests in the fact that judging, opinion or propaganda are presented as the absolute truth. The authors of articles and information on the social networks work with several obscure and ambiguous terms in order to cover ambivalence of opinions while individuals share the information and foist their unilateral and manipulative commentaries. This system completely avoids all arguments that could raise any doubt in the minds of the audience. When people encounter information that seems to be completely clear to them, it is the hidden persuasion that raises doubts in their minds [5].

There are millions of people involved in the process of communication on social networks. They enter the communication via topics that they want to share. These topics provoke moods which can rapidly transform into opinions and when the opinions of a critical number of people converge, the public opinion is created. This public opinion then creates a certain stance in the mind of a person which prompts one to behave in certain ways when in critical situations [2, pp. 11-12]. Therefore, it is very important for people to educate themselves so as to be able to critically access the information gained from the social networks.

* [1]Daniel Slivka, [2]Janusz Mierzwa
[1]Department of Historical Sciences, Greek Catholic Theological Faculty, University of Presov, Slovakia
[2]Institute for Social Work, Faculty of Social Sciences, Pontifical University of John Paul II in Cracow, Poland
E-mail: daniel.slivka@unipo.sk

Thus, they gradually uncover the potentially unfair practices and methods in the mass-media routine.

One may encounter also other manipulative practices on social networks today, which are used to influence or manipulate people, such as:

- "Deliberate concealment of certain as well as inconvenient information" – it is the easiest and at the same time simplest way to influence recipients. In intentional and deliberate concealments, media makers deliberately omit certain details of the message, such as circumstances, persons involved or even whole thoughts and messages considered unfit to the manipulators' agenda. As a result, there appears only a brief commentary on the networks, as it is not the right time or situation for the whole message. The important information is modified to such an extent that it affects the whole approach to the information. The authors do not conceal the important information completely. On the contrary, they reveal the information, but they try to lessen the significance of its importance or to emphasize half-truths which are suitable for them [4, p. 84].
- "Intentional publishing of unverified information" – the publishing of an unverified information on the social networks makes the message uncertain or even false. It is a classic model of political manipulation. Information usually concerns likely events which could, but do not have to happen. The information becomes credible due to its probability and the information chaos within which it is presented [4, p. 86]. This model is often used in the political sphere, during political campaigns, often being the result of dishonesty in obtaining and verifying the information. Rather than verifying the veracity of the reported message, the authors tend to use universal phrases, such as "it is common knowledge" or "as we unofficially learned" as well as "we have information that" and so on [6].
- "Purpose-made and sophisticated accusations" – abusing and challenging competitors, opponents, rivals and institutions in discussions on networks because they are inconvenient. They are primarily unverified and distorted pieces of information – so called "News". It is a very effective method for labeling of persons and institutions or for foisting opinions to create a prejudice against their rivals. It is a manipulation with truth, [2, p. 33] as there is no need to publish negative messages, but rather insinuation (Lat. insinuare), getting to the trust, [7, p. 312] targeting suspicion, peaching in order to humiliate or to destroy good reputation etc. All these practices are used mostly in the political sphere where one can find lies, defamation, slander and informing others by means of unverified messages. There are various forms of unverified messages commonly being used.
- "Verbal and written attacks" – it is closely connected with the already mentioned insinuation. It means labeling some person or institution with certain purpose-made easily memorized attribute regardless whether it is the truth or just a statement [4, p. 90].

2. Specific Influences of Media in Interaction on the Social Networks

It is necessary to be acquainted with specific influences of media in the interaction on the social networks that belong to basic elements of contemporary media education. The social networks distribute a very large amount of information which sometimes makes it virtually impossible to resist their influence. In media education, therefore, it is necessary to know of the specific influences through which the social networks affect their users. What follows are specific types of influences:

- "The influence of the so-called overlap" – it is primarily about diverting someone's attention from a problem to another issue. The real message is not to be revealed, it is either covered or masked. It is an intentional concealment of inconvenient information as a directed type of manipulation. However, it does not hide the information, but rather overlaps it. In the US, the phenomenon is known as "red herring" [4, p. 92].
- "The influence of false authorities" – the important role is played by a person whose opinion has great influence on the society and public opinion. There are persons on the social networks that present themselves as authorities, but they do not have stable ethical and moral values, belonging instead to various opinion platforms. For example, these persons belong to the extreme right and left and their opinion platform is at or beyond the boundary of the human rights and religious values [8].
- "The impact of the loss of knowledge" – numerous interpretations and the sharing of media contents that spread through social networks are based on or originate in the interpretation itself (not in the original source) which is simply taken or shared with the interpreter's own commentary [9, pp. 69-81]. At the same time, the information does not have a concrete historical basis and a clear source. This phenomenon is widespread and happens with increasing frequency. There are some media that use lies about the past and focus only on the present and their argumentation is based on mediated interpretation without a clear scientific source or a necessary fact checking [4, pp. 96-98].
- "The influence of violence, attacks, fear and emotion" – the social networks are used to spread fear and a sense of threat from the potentially violent third parties [10], such as immigrants or minorities who are in some way threatening the majority society. This is sometimes based on real situations [11, pp. 17-25]. To present an example from Slovakia, we recently witnessed a political campaign which reacted to the immigration crisis and several political parties

made a profit from this campaign. However, in 2015 only 330 migrants applied for asylum in Slovakia and it was granted to only 8 persons. 124 migrants did not receive asylum and in other 148 cases the process was stopped for various reasons or the migrants used Slovakia only as a transit country. As of October 2016, only 62 people applied for asylum in Slovakia, 155 applications were granted, 42 applications were refused and in 20 cases the process was discontinued [12]. However, in 2016 during the electoral campaign to the National Council of the SR the social networks paid great attention to the issue of migrants, appealing to the national identity and patriotism of Slovaks. This appeal, though, affected primarily the people's emotions. Unfortunately, scientific observations indicate that negative emotions on the social networks considerably exceed the positive ones, which disturbs mental conditions or causes unstableness in one's emotional experience of every-day reality [13]. The voters were supposed to decide about their future under such conditions which naturally led them to make this important decision under the influence of their emotions [14].

- "The influence of the adopted position" – a subjective message which is subject to personal stances, feelings and interests that are based more or less on the personal experiences of their author. It is a complete opposite to an unbiased and objective message which is a basic condition for serving the truth. Those sharing the information shape the truth by their very choice of language. If the media and the social networks do not seek the truth, they will end up making it up and trading with it. The truth itself will thus become a product and its interpretation will be subject to trade. It is necessary to separate the information from its subjective commentaries, because these spread (or even force upon people) a subjective point of view. On the social networks, such approach is considered to be a dangerous manipulation which is based on the fact that information is served from a biased point of view. Therefore, it is necessary to constantly verify important information from several independent sources.
- "The influence of goodwill" – a rather often used practice that can be found in commentaries of shared contents on the social networks. As a form of manipulation, it uses simple human trust and affection [15, p. 24]. It is evident in: "Every reasonable person must recognize that..." It is a latent promotion of subjective requirements in the sense of goodwill or help or various assurances about the accuracy of shared information.

3. The Social Networks, Threats and Risk Content

The contemporary social networks contain numerous Facebook profiles which, besides their classic agenda, purposefully use and present ideas of anti-Semitism, racism and xenophobia. Unfortunately, this negative phenomenon appears quite often on the social networks, as there is an increase of nationalism (migration issue), patriotism and the extreme right movement. They aim to establish themselves in the society and achieve the best possible election result. With this goal in mind, they use various forms of manipulation in order to gradually establish the ideas of anti-Semitism, racism and xenophobia. They justify it by claiming to protect Slovakia, race or Christian tradition. It is important to re-emphasize that in Slovakia, the promotion of the ideas of anti-Semitism, racism and xenophobia is accompanied with highlighting the importance of Christian religion. The material which is gradually published and promoted on the social networks is not, at the first glance, dangerous for the user. On the contrary, this material shows a strong national, Christian, and cultural awareness, but inserted among these positive values are also the ideas of anti-Semitism, racism and xenophobia. For the users, it seems to be right and in accordance with the protection of national interests. However, what they do not see is that it contradicts the very Christian religion they wish to promote. Such organizations use a great variety of different symbols, signs, terms and verbal expressions that can be used for their self-identification, but, they can also be useful as rallying tools to boost the adherents' (or sympathizers') zeal for national interests.

The following features are characteristic for all such profiles [16]:

- General profile of the group – most often, it is one user with a general name who shares and publishes contents. Moreover, this user reacts to all comments in terms of manipulative and foisting techniques. When identifying concrete names of some profiles the user does not want to reveal one's own identity, even if requested, while this person can see the public profile of other people, their personal as well as basic information, which is not in accordance with fair-play communication.
- Religious name of profile – in particular, there are profile names taken from the Christian religion or based on the motives from the Bible, such as: living faith, Magnificat Slovakia etc. Such religious names appeal to users' confidence that it is a serious group. For example, the above-mentioned name Magnificat is based on the traditional Marian pilgrimage and cultural tradition in Slovakia.
- Religious content published with the highest priority – profiles like this publish religious content that inspire confidence with the high priority label linked with their messages. Besides the religious content, however, especially during the time of elections, there appear persons and groups with national interests that are presented to be religiously grounded, stable in values and faith. Quite paradoxical then is their aversion to the Jews (whom they label as "Zionists"), foreigners and non-white citizens. In this context, the Z.O.G. platform - Zionist Occupation Government or Zionist Occupied Government

are promoted as a fight against the established system, using propaganda that includes the denial of the Holocaust [17]. The suggested attitude often appears in comments of the shared contents that appeal to emotions focusing on anti-multicultural society based on intolerance towards other ethnic groups. The manipulators use religious rhetoric for spreading these ideas.

4. Conclusion

All people using often diverse social networks either as private persons or as members of some groups are prone to fall a prey to manipulation by either certain persons or media. Thus, they become victims of unhealthy, or even dangerous and aggressive ideas leading to intolerance or even hatred towards certain ethnic or religious groups of people.

Many of Facebook posts are based on factors of emotions, euphoria, feeling of danger and the need to protect one's culture. By means of this devious rhetoric they create an atmosphere of fear instead of the promised sense of security. They try hard to target or recruit people who are easy to influence and manipulate. There is a great need for individual awakening and for educating all age categories who find themselves in the in the circle of influence and power of mass media. This need stems from the fact that most people are not aware that they are influenced by manipulation and to what extent their communication on the social networks may influence them. Yet, these people continue to think that they are the ones who decide about which values, morals and principles should be accepted and which rejected [18, pp. 139-142].

A paradox emerges in this situation as we, once again, witness a dangerous phenomenon in Slovakia, wherein the promotion of the ideas of anti-Semitism, racism, and xenophobia is coupled with an emphasis on Christian religiosity, or more precisely, pseudo-religiosity [19, pp. 75-96]. Ideas and content that gradually emerge on social networks are initially harmless to the common user. They rather appear as a positive promotion of a strong Christian and cultural awareness present in and among true Slovaks, which is commonly perceived as beneficial to the Slovak society. Only later, ideas of anti-Semitism, racism, and xenophobia infiltrate the network, being intentionally inserted there by extremists. The user's critical discernment is caught off guard because these extreme ideas appear to be in harmony with the noble task of protecting one's national and cultural interests [20, pp. 75-96]. One thus fails to notice that the content of these ideas contradicts the very Christian religiosity that it claims to promote, neglecting "the logic of God's plan and its divine historicity" [21, p. 162]. These movements use a series of symbols, signs, terminology, and slogans that, on the one hand, serve their self-identification and, on the other hand, have the function of self-agitation for national interests and for the Slovak citizen identity.

References:

[1] *Medial Reality (in Slovak).* http://fpv.uniza.sk/orgpoz/realita/REALITAmedialna.pdf. (10.02.2015).

[2] LUSCON, J.: Do Mass Media Control Us? (in Slovak), Bratislava: Don Bosco, 2012. ISBN 978-80-8074-158-7

[3] PALA, G.: The Family in Media Ciphers. *European J. of Science and Theology,* vol. 11, No. 6, 2015, 45-56. ISSN 1841-0464.

[4] ILOWIECKI, M., ZASEPA, T.: The Power and Disease of Media (in Slovak), Bratislava: VEDA: SAV (ed.), 2003. ISBN 80-224-0740-2.

[5] PALA, G., POLAKOVA, M.: *Online Age - Online Church I* (in Slovak), Presov: GTF PU, 2013. ISBN 978-80-555-0891-7. As Valco points out, it is therefore the goal of media strategists "to be more efficient in marketing whatever it is, they (the new political aristocracy, social engineers, and/or economic oligarchs) wish to sell - products, services, values, or general outlooks". See: VALCO, M.: Rethinking the Role of Kierkegaard's 'Authentic Individual' in Liberal Capitalist Democracies Today (p. 130), *European J. of Science and Theology,* vol. 11, No. 5, 2015, 129-139. ISSN 1841-0464.

[6] PRISTASOVA, I.: *Manipulation in Political Reporting* (in Slovak), http://spr.fsv.ucm.sk/ archiv/2005/2/pristasova.pdf. (04.10.2014).

[7] SPANAR, J., HRABOVSKY, J.: *Latin/Slovak - Slovak/Latin Dictionary* (in Slovak), Bratislava: Slovenske pedagogicke nakladatelstvo, 1962. ISBN 80-08-02051-2.

[8] PRISUDOVA, I.: *Tabloid Press in Slovak Media* (in Slovak), http://158.193.113.200: 8080/record/131/files/BC_2006_00089.pdf. (04.10.2014).

[9] PALA, G., POLAKOVA, M.: *Online Age - Online Church II* (in Slovak), Presov: GTF PU, 2013. ISBN 978-80-555-0935-8.

[10] BEROU, L.: *Negative Influence of Television on Children* (in Slovak), Presov: Vydavatelstvo Michala Vaska, 2012. ISBN 978-80-7165-872-6.

[11] JURJEWICZ, H.: How Spirituality Leads to Resilience a Case Study of Immigrants. In *European J. of Science and Theology,* vol 12, No. 4, 2016, 17-25. ISSN 1841-0464.
[12] MINISTERSTVO VNUTRA SR: *Asylum and Migration. Statistics* (in Slovak), http://www.minv.sk/?statistiky-20 (01.09.2016).
[13] BACHLETOVA, E.: *When Emotions are not Enough... Knowing Today's Media* (in Slovak), *http://www.evabachletova.sk/articles/179/ked-uz-emocie-nestacia-poznanie-z-dnesnych-medii.* (04.10.2014).
[14] NOVOTA, M.: *Communication Training for Candidates to National Council of the SR in 2016* (in Slovak), 2016, Presov.
[15] JURJEWICZ, H.: *The Role of Psychology in Religion and Spirituality.* New Jersey: Diocesan House of Formation: Bartimaeus New Jersey, 2014. ISBN 978-0-9967396-0-3.
[16] SLIVKA, D.: Conducted Surveys and Expressions on Facebook Social Network from 1.10.2015 to 31.3.2016 (in Slovak), Presov: PU GTF. 2015-2016.
[17] MARES, M.: Symbols Used in the Czech Republic Today (in Slovak), Praha: MVCR, 2006, 38-39.
[18] ZASEPA, T., OLEKSAK, P.: How to Understand Television (in Slovak), Ruzomberok: Verbum, 2014. ISBN 978-80-561-0103-2
[19] For more on the topic of man's anxiety from a Christian perspective, see: PAVLIKOVA, M.: The Concept of Anxiety and its Reflection in Auden's work 'the Age of Anxiety. *European J. of Science and Theology,* vol. 12, No. 4, (2016), 111-119. ISSN 1841-0464; KRALIK, R.: Key Philosophical-Theological Concepts of Soren Kierkegaard in the Work of Paul Tillich. *European J. of Science and Theology,* vol. 11, No. 4, 2015, 181-183. ISSN 1841-0464; KRALIK, R., TOROK, L.: Concept of Relationship God-man in Kierkegaard's Writing what we Learn from the Lilies in the Field and from the Birds of the Air. *European J. of Science and Theology,* vol. 12, No. 2, 2016, 67-70. ISSN 1841-0464; and VALCOVA, K., PAVLIKOVA, M., ROUBALOVA, M.: Religious Existentialism as a Countermeasure to Moralistic Therapeutic Deism, *Communications - Scientific Letters of the University of Zilina*, vol. 18, No. 3, 2016, 99-101. ISSN 1335-4205. VALCO, M., KRALIK, R., BARRET, L.: Moral Implications of Augustine's Philosophical and Spiritual Journey in his Confessiones, *Communications - Scientific Letters of the University of Zilina*, vol. 17, No. 2, 2015, 103-108. ISSN 1335-4205.
[20] BORZA, P.: *National Socialism and Church in the Context of the Slovak Republic* 1939-1945 (in Slovak), Kultura popularna a religia i wartosci spoleczne, Tarnow: Eikon Plus, 2013, 75-96. ISBN 978-60391-32-7.
[21] KONDRLA, P., KRALIK, R.: Authentic Being and Moral Conscience. *European J. of Science and Theology,* vol. 12, No. 4, 2016, 155-164. ISSN 1841-0464.

Janez Vodicar*

ETHICS AND NATURAL SCIENCE THROUGH PAUL RICOEUR'S HERMENEUTICS

Paul Ricoeur's well-known perspective on philosophical hermeneutics could also be applied in the understanding of natural sciences. This should resemble dialectic between explanation and understanding, which would enable the kind of objectivity that is claimed in all areas of science. Therefore, science could be viewed as an epistemological activity focused on modeling and confirmation of theory, as well as a theoretical practice that operates alongside other technological, ethical, and political practices. From epistemological perspective we will look for a role of hermeneutics in natural science. Explanation and understanding connect natural science with hermeneutics. Through a narrative position of Ricoeur's hermeneutics, we can understand the connection between science and its responsibility.

Keywords: *Natural science, hermeneutics, Paul Ricoeur, narrative, subject of responsibility.*

1. Introduction

In 1996, physicist Alan Sokal published an article in *Social Text,* a popular cultural studies' magazine, which was primarily a hoax. "The article, entitled 'Transgressing the Boundaries: Toward a Transformative Hermeneutics of Quantum Gravity', is abundant in absurdities and blatant non-sequiturs. In addition, it asserts an extreme form of cognitive relativism: after mocking the old-fashioned 'dogma' that 'there exists an external world, whose properties are independent of any individual human being and indeed of humanity as a whole', it proclaims categorically that 'physical 'reality', no less than social 'reality', is at bottom a social and linguistic construct'" [1, pp. 1-2]. The article was not only published, but included in a special issue, which was meant to chastise scientists who did not accept postmodernist understanding of science as a social and linguistic construct. Even though the article names hermeneutics more or less only in the title, it is clear whom it is criticizing. Sokal is convinced that relativism in natural sciences, which is defined by postmodernist thinkers who claim a hermeneutic approach, opens a door to religious obscurities and pseudo sciences [2, p. 101].

The above-cited book, which was based on the article, explains, "We make no claim to analyze postmodernist thought in general; instead, our aim is to draw attention to a relatively little-known aspect, namely the repeated abuse of concepts and terminology coming from mathematics and physics" [1, p. 4]. Humanities are therefore supposed to be abusing concepts in mathematics and physics as well as obscuring the basic scientists' mission: to research and test through well planned and controlled experiments. They are mostly bothered by the complicated language and intricate manipulation of terminology, which is taken from natural sciences. "Our aim here is to stimulate a critical attitude, not merely towards certain individuals, but towards a part of the intelligentsia (both in the United States and in Europe) that has tolerated and even encouraged this type of discourse" [1, p. 7].

Not a very encouraging start of a research, which aims to show how necessary hermeneutics is to modern natural sciences. Thankfully, the authors did not include Paul Ricoeur with their postmodernist thinkers, because our thesis, which says that hermeneutics is a step in scientific investigation, comes from the thought of this twentieth century French philosopher. Many people credit him with setting the foundations of hermeneutic philosophy, which is today spread in Europe as well as United States [3]. Our aim is to show that P. Ricoeur's approach is appropriate both for questions in humanities, such as the influence of science on society and scientists' responsibility, as well as natural sciences themselves, because they always need to develop new models, form theories, and explain the achieved results.

* **Janez Vodicar**
Faculty of Theology, University of Ljubljana, Slovenija
E-mail: janez.vodicar@guest.arnes.si

2. Ricoeur's Approach to Hermeneutics

Ricoeur began his philosophical journey in the spirit of Husserl's phenomenology. For our research, it is important that the leading thought in Ricoeur's philosophy acknowledges and faces the boundaries of one's own understanding. He does not see that as an obstacle, but as a catalyst for creative imagination. We do not have a direct access to the knowledge of ourselves; we understand and place ourselves through meanings that we have to interpret [4, p. 221]. Through speaking, we become aware of consciousness and also form it. Discourse, which Ricoeur accepts from Beneveniste, introduces a semiotic function of language, based on *the sign*, a semantic function that originates from the sentence and which introduces the expression of an event, which is otherwise unnoticed by structural analysis [5, p. 25]. For us it is important that Ricoeur begins to explore written text in his development of hermeneutics. An event that is lost in speech, is in written text distanced from the original event, but precisely because of that allows the reader to give it life again. Text allows a "threefold autonomy: with respect to the intention of the author; with respect to the cultural situation and all the sociological conditions of the text production; and finally, with respect to the original addressee" [6, p. 91]. This threefold autonomy of the text does not mean that the author is lost. What the text tells me now is more than the author intended to say, because the process of exegesis is needed, through which the readers bring their own views [6, p. 201]. Here, we do not mean some relativism of interpretations as criticized by Sokal, even though multiple interpretations of the text are possible. Still, it is always possible to argue for a more correct interpretation, which can be double checked, because we have now established an objective field of research – inclusion of discourse into the text. Every text has limitations in interpretation however [6, p. 213].

Ricoeur's dedication to hermeneutics is, aside from his search for proper interpretation, also seen in his search for a broader field in which an individual is able to create new meanings. Man is always born into an environment, which is why cannot be aware of himself unless he becomes one with the meaning, which is first found outside of him [4]. If philosophy has its sources and presuppositions which it must follow and also be aware of, it cannot be caught in some totality in itself. "Like Derrida, Ricoeur thinks that objectifying methods are an indispensable 'guardrail' to interpretation, a necessary protection against lapsing into an 'anything goes' attitude. But he also thinks they should not be the tail wagging the dog. To make the text an object to be explained with the help of some method for the sake of the objectivism in interpretation and to identify this task as the whole hermeneutical task is to treat the text like 'a cadaver handed over for autopsy' and to act 'as though one were to give the funeral eulogy of someone yet alive" [7, p. 68]. Thus we rise above the division between explaining and understanding, which was introduced by Dilthey. If the former is reserved for natural science and the latter for humanities, Ricoeur finds that it is in the text where this division is bridged. "I am most suspicious of the old opposition between understanding, which would be the portion of the first science, and explanation, which would be the lot of the second. If the communication of past heritages takes place under the condition of distanciation and objectification, then explanation is a necessary step for understanding. We always explain in order to understand better. A text must be explained in its internal structure before being understood in its relation to the interest it arouses and to which it responds" [8, p. 264]. Through interpretation and explanation of a text, we look for validation of our guess. This happens, for example, through the analysis of linguistic structure, style, author's history, etc. "Validation, which Ricoeur is careful to distinguish from verification in a positivist sense, involves weighing an initial guess against other possible guesses, and selecting the most probable one as the best interpretation" [2, p. 73]. We can only understand through explanation. Hermeneutic circularity weaves between the whole and its parts, as well as individual parts and their whole in research, as we are searching for a new meaning. The entire process, which takes place from a methodically influenced explanation to the non-methodical moment of understanding, marks Ricoeur's hermeneutics [2, p. 85]. This understanding must lead to appropriation, because only then the discourse becomes an event again and is therefore free from its initial connection to the author and causes a change in the reader [9, pp. 33-35]. This moment of appropriation is important in the communication of scientific discoveries, because without it, it remains knowledge, trapped in a laboratory [5, pp. 201-202]. Ricoeur stands for objective explanation, which is an ideal in science. However, he insists that any objectivization is connected to an individual experience. "I have always argued in favor of a coordination between (experienced) understanding and (objective) explanation. I want to explain in order to better understand" [10, p. 126].

3. Natural Sciences and Hermeneutics

If we can learn anything from Ricoeur's theory, it is that hermeneutics needs interpretation. There is no direct and unbiased understanding, which is why we need explanation that can lead to better understanding, which is also the goal of scientific field. However, when we use hermeneutics in science, we have to be mindful of relativism, which we have mentioned at the beginning with Sokal's help. When we move past Descartes' and Bacon's views of science, hermeneutics leads to a slippery slope of uncertainty, which introduces numerous variables into practical empirical experimentation and creation of laws. At the very beginnings of modern empirical science, F. Bacon reminded us of four types of idols, and only after we clear our minds of them, can we begin a true scientific procedure. The development of positivism, which followed this demand, developed this outlook

as possibly an increasing division between humanities and natural sciences, which is summarized by Dilthey in his step-by-step differentiation between understanding and explanation.

Despite exaggeration, which some postmodernist thinkers introduce to interpretation of natural sciences, even Sokal and Bricmont agree that hermeneutic critique of naïve modernism is needed. They also accept interdisciplinary work, but with clear boundaries and jurisdictions in methodology of each scientific field [1, pp. 183-185]. If we begin with the description of the three possible primary attitudes towards science, as defined by Ian Barbour, and as have been confirmed through history, which are positivism, instrumentalism, and idealism [11, p. 162], we can say that we have largely moved past the naïve positivistic approach, in which scientists are supposed to be some "labor-saving mental devices for classifying observations". Instrumentalism says that a scientist is the person who thinks of and prepares an experiment. Thus he is responsible for "(a)calculating devices for making accurate predictions, (b) organizing guides for directing further experimentation, and (c) practical tools for achieving technical control" [11, p. 165]. The scientist then already needs imagination, which only serves as 'useful fictions', but it will be difficult for the scientist to decide which of the theories was more accurate once he gathers all his data [2, p. 4). Scientific theories for the idealist are "entirely imposed by the mind on the chaos of sense-data" [11, p. 166]. This is a clear opposition to positivism, because this theory says that atom as such was not discovered, but devised as a mental construct. However, such approach to science cannot explain why certain theories explain our empirical data better than others, and why not all explanations of natural phenomena are equally correct [12].

Barbour follows critical realism, through which he intends to fix all the problems of the above-mentioned approaches. "Against the positivist, the realist asserts that the real is not the observable. Against the instrumentalist, he affirms that valid concepts are true as well as useful. Against the idealist, he maintains that concepts represent the structure of events in the word. The patterns in the data are not imposed by us, but originate at least in part in objective relationships in nature. The object, not the subject, makes the predominant contribution to knowledge. Hence science is discovery and exploration, not just construction and invention" [11, pp. 168-169]. This does not prove that hermeneutics is necessary, but it can be claimed that Barbour confirms the need for interpretation, which does not deny the objectivity of scientific experimentation. But there are also no uninterpreted facts [2, p. 4]. The need for interpretation makes scientific language symbolic, and thus we enter the area of many different interpretations of the same sign or fact. But since this means polysemy, Ricoeur claims that hermeneutics is needed. This is not just mere poeticism, which freely creates new meanings, as criticized by Sokal and Bricmont, but a methodologically difficult process which is subject to certain laws, as shown by Ricoeur in his discussion on metaphor [13].

Many scientists would oppose this, saying that they already have epistemology in their own scientific field, which clearly defines what and how can be researched and how to interpret it. They do not require any metaphysical poetic approaches, which would use natural sciences as an excuse to creating new metaphors [1, p. 187]. Wentzel van Huyssteen, who follows Barbour, claims that hermeneutics and epistemology are organically interconnected in science. All language is metaphorical and we need hermeneutics to use it correctly in epistemological approach [14, p. 158]. On the other hand, he warns that opposition of postmodernist indubitable foundations for knowledge can lead to the loss of rationality, which is the base of any argumentation.

4. Hermeneutics and Science

P. Ricoeur was always against the confusion of fields [10, p. 14]. According to him, separation of fields not only prevents irresponsible, oversimplified discussions, which make no new discoveries, but is able to produce reasons for new meanings to be developed. Variety, as we saw in chapter one, leads to a necessity for interpretation, and thus promotes thoughtfulness and creativity, which drives new research. Just as new text initially distanced the reader, a meeting of different scientific fields and views is the distanciation that requires interpretation. Through the process of distanciation in science we are first given the option to conduct research. It is a definition and a limitation of the field of research. At the same time, we allow ourselves to think about this objectively and in a way – at least partially – free ourselves from presuppositions that we bring into research. This also triggers the need for interpretation, because distanciation brings unrest to accepted concepts [15, p. 44]. However, "hermeneutics proceeds from a prior understanding of the very thing that it tries to understand by interpreting it" [16, p. 352]. We must know ahead of time that we can clear up all confusion and false understandings, but we will have to keep looking for proper answers and solutions through public interpretation and by following the laws of hermeneutic cycle.

Interdisciplinary cooperation can in itself give us an opportunity for distanciation and demand new understanding. Finally, appropriation of a new meaning, truth, or discovery, is an end goal of any interpretation, whether of a text or of scientific data. "Finally, insofar as the appropriation of the world which the text unfolds may result in an expansion of the horizons of consciousness, the process of interpretation creates the possibility for a critique of the egoistic illusions and ideological distortions of the subject" [17, p. 67]. This critique of narrow consciousness, which occurs in the process of interpretation and allows for a new outlook, opens a new creative potential for science as well, which cannot happen if it remains limited to empirical research in a sterile laboratory. Educational role of a scientist, as has been required by the educational system since the enlightenment is:

the expansion of the horizons of consciousness, which leads to improved life style of an individual and society [18, pp. 184-186].

5. Conclusion

Sokal and Bricmont conclude their critique of postmodernist abuse of science with the role of politics in this phenomenon, which is seen both in its support of relativism and in its ability to change it [1, pp. 197-205]. We conclude that the use of Ricoeur's hermeneutics helps raise responsibility of the society to science and of scientists to the society. As Ricoeur stressed in his conversation with Changeux, man cannot be divided into a scientist, normal human being, or a religious person, because it is impossible to pluck him out of his environment and away from suppositions that help him make decisions and choices; instead he must be encouraged to better explain his actual state, in order to gain a better understanding [10, pp. 125-126]. He also cites examples of scientists who claim that neurons think. It is an example of typical reduction, which abuses science and thus causes unnecessary conflicts. With his critical reading Ricoeur binds both scientists and philosophers, to find the best possible answers for the wellbeing of humanity through confrontation with each other. He asserts that they will use their authority, which he sees as a necessary realm of humanity, responsibly in order to promote and educate people to take their responsibility too.

References:

[1] SOKAL, A. BRICMONT, J.: *Fashionable Nonsense Postmodern Intellectuals' Abuse of Science.* New York: Picador, 1998. ISBN 0-312-19445-1.

[2] REYNHOUT, K. A.: *Interdisciplinary Interpretation: Paul Ricoeur and the Hermeneutics of Theology and Science.* Lanham: Boulder : New York: Lexington Books, 2013. ISBN 978-1-4985-1587-0.

[3] REAGAN, CH. E.: *Paul Ricoeur His Life and his Work*. Chicago, London: The University of Chicago Press, 1996. ISBN 0-226-70603-6.

[4] RICOEUR, P.: *The Conflict of Interpretations. Essays in Hermeneutics.* Evanston: Northwestern University Press, 1974. ISBN 978-0-8264-7709-5.

[5] VAN DEN HENGEL, J. W.: *The Home of Meaning. The Hermeneutics of the Subject of Paul Ricoeur.* Washington: University Press of America, 1982. ISBN 0-8191-2603-9.

[6] RICOEUR, P.: *Hermeneutics and the Human Sciences: Essays on Language, Action and Interpretation*. Cambridge: Cambridge University Press, 1981. ISBN 1-107-14497-3.

[7] WESTPHAL, M.: *Whose Community? Whose Interpretation?* Grand Rapids: Baker Academic, 2009. ISBN 978-0-8010-3147-2. See e.g.: JUROVA, J.: On Etzioni's Concept of a Responsive Community. *European J. of Science and Theology,* vol. 12, No. 3, 2016, 71-80. ISSN 1841-0464.

[8] RICOEUR, P.: *Ethics and Culture: Habermas and Gadamer in Dialogue*. In: Political and Social Essays. Ed. David Stewart and Joseph Bien. Athens: Ohio University Press, 1974. ISBN 0-8214-0169-6.

[9] This hermeneutic procedure applies not only to texts but also to visual phenomena. See: KLUN, B.: Distinction by Marion between Idol and Icon and the Question of Hermeneutics (in Slovenian). *Bogoslovni vestnik - Theological Quarterly*, vol. 76, No. 1, 2016, 25-35. ISSN 0006-5722

[10] CHANGEUX, J.-P., RICOEUR, P.: *What Makes Us Think? A Neuroscientist and a Philosopher Argue about Ethics.* Princeton: Princeton University Press, 2002. ISBN 978-0-691-09285-0. On this topic, see also: KONDRLA, M., PAVLIKOVA, M. From formal ethics to existential ethics. *European J. of Science and Theology,* vol. 12, No. 3, 2016, 101-111. ISSN 1841-0464. KONDRLA, P., KRALIK, R.: Authentic being and moral conscience. *European J. of Science and Theology*, vol. 12, No. 4, 2016, 155-164. ISSN 1841-0464. VALCO, M., KRALIK, R. & BARRETT, L.: Moral implications of Augustine`s philosophical and spiritual journey in his confessions. *Communications - Scientific Letters of the University of Zilina*, vol. 17, No. 2, 2015, 103-108. ISSN 1335-4205.

[11] BARBOUR, I. G.: *Issues in Science and Religion.* New York: Prentice-Hall, 1966. ISBN 0-334-00737-2.

[12] Compare with: HANES, P. & MASARIK, M.: Complementarity of Science and Theology. *European J. of Science and Theology,* vol. 12, No. 6, 2016, 5-20. ISSN 1841-0464.

[13] RICOEUR, P.: *The Rule of Metaphor.* Toronto, Buffalo, London: University of Toronto Press, 2000. ISBN 0-8020-6447-7.

[14] VAN HUYSSTEEN, W. J.: *Theology and the Justification of Faith: Constructing Theories in Systematic Theology.* Grand Rapids : Eerdmans, 1989. ISBN 0-8028-0266-0.

[15] RICOEUR, P.: *Interpretation Theory: Discourse and the Surplus of Meaning*. Fort Worth: Texas Christian University Press, 1976. ISBN 0-912646-59-4.

[16] RICOEUR, P.: *The Symbolism of Evil*. Boston: Beacon Press, 1967. ISBN 0-8070-1567-9.

[17] THOMSON, J. B.: *Critical Hermeneutics. A study in the thought of Paul Ricoeur and Jurgen Habermas.* Cambridge: Cambridge University Press, 1995. ISBN 978-0-521-27666-5.

[18] The roots of this idea in the European context go all the way to the Humanists and the reformers in the 16th century. On this topic, see: VALCO, M.: The roots and nature of Luther's theological understanding of 'Missio Dei' in the Context of Reformation agenda. *European J. of Science and Theology,* vol. 12, No. 4, 2016, 181-188. ISSN 1841-0464.

Dalimir Hajko*

ETHICS AND SCIENCE: CHALLENGES AND POSSIBILITIES

Perhaps the biggest challenge for the relationship of ethics and science is the issue of whether or not it is justifiable to manage human related research (for example, the question of whether we should have a moratorium on research that constitutes dangers to human being and/or humanity) socio-ethically. The author asks the question if such management is principally possible. Scientism and socio-ethical nihilism have increased their influence which manifests itself, among other things, in attempts to seclude 'a unique ethics of science' based on objective postulates of knowledge alone, separated from social praxis as well as from ethical values of humanity. Related to this situation is the fundamental question whether an ethical 'self-regulation' of science, detached from social factors that are foundational for such regulation, is at all possible. Science in and of itself does not enter into a contradiction with some abstract ethical norms: a conflict can only be induced by a specific form of its functioning in relation to concrete historic demands of morality. Another important starting point for our deliberation on this topic is the question what makes (or motivates) scientists concern themselves with moral or social problems of regulating the scientific knowledge and scientific or technological praxis? In addition to a rapid growth of scientific and technological possibilities and the ensuing serious problems of social responsibility, it is also the non-existence of such social institutions that would be able to ensure an effective and sufficiently flexible regulation of scientific research, i.e. institutions that would make it possible to diminish the gap between the interests of science and its socio-ethical consequences. Conclusion: there is no secluded, particular ethics of knowing that would be based on an abstract concept of the objectivity of science.

Keywords: *Ethics, science, technology, society, responsibility.*

1. Introduction

Ethics, science and technology are at first glance different and divergent areas of human activity, but on closer inspection we find that they have many intimate points of contact. If we think about science and technology from the standpoint of philosophy, or in the strict sense of ethics as a philosophical discipline that deals with human behavior by exploring morality and the moral standards, in these cases we can easily become victims of mystification of the philosophical and ethical balance. From this moment on we start wondering what brings one more good and, on the other hand, what seems likely to cause harm and evil.

To one's moral consciousness, when isolated from the social and historical resources of goodness, it may seem that the good and evil in the world are akin to well-defined proportions. For example, some knowledge of science can be used but also abused; a given discovery in the world of human technology can directly or indirectly help or harm. New knowledge and discoveries appear to be beneficial to humans, and yet we must also conclude that false moral principles - promoted by a political power or ideological fanaticism - can critically restrict us in the development of technology or hinder scientific progress.

If our interests in these three areas are simplistically identified with their own benefits to each area separately and if we apply to them the concept of good, we could easily slip into the theory that if we do good for ourselves - that is, if we programmatically build our own territory of interest – it is in principle at the expense of another interest. On the other hand, were we to retreat from these positions in order to promote the interests of another sphere, we cause harm to ourselves. We might get as far as embracing the notion that as the development of science does not take into account the ethical ideas of morality and plays no role in forging moral customs, the acceptance of moral principles could be based on the non-acceptance or the reduced respect for the autonomous regularities of scientific thought.

* **Dalimir Hajko**
Department of Philosophy and Religious Studies, Faculty of Humanities, University of Zilina, Slovakia
E-mail: dhajko@h-h.sk

2. From Anthropology to Critical Questions of Ethics

The proposed initial ideas seem to suggest that the overlaps between these areas should be based on a sensitive and thoughtful self-reflection. Cardinal questions derived from our recent study of anthropology give rise to contradictory answers: Can ethics as the science of morality interfere with biology, genetics and the human psyche and, if so, to what extent? Do we, in identifying baselines and determining socio-ethical principles, follow through with our scientific study of human being, especially in cases when direct experiments with humans are necessary? What is actually the ethics of scientific knowledge and how are its various elements correlated with the general ethical values of humanity?

Many scientists raise the question of the socio-ethical governance of research on humans. Many have already commented on the question of the admissibility of a moratorium on research which threatens humanity. We are, however, entitled to ask another question: Is such management of research (associated with inevitable restrictions) in principle at all possible, is it appropriate and, if so, then in what form? Does it inevitably restrict the freedom of scientific research, stifling promising innovations in their very origin? What is the correlation between this freedom on the one hand and the social and humanistic responsibility of science and scientists on the other? Linked to this is the key problem of the self-regulation of ethical science. Is the "self-regulation" of science based solely on ethical standards possible?

This question can only be answered in the negative, because there can be no real solution to such a dilemma between science and morality that can arise from a holistic understanding of the human world, radically isolated from the social factors that constitute its foundation. Science itself has not come into conflict with abstract ethical standards in themselves but always only with a particular form of its functioning, with the requirements of concrete historical morality, which are, of course, also socially conditioned. "Virtues can only be understood in terms of their relation to the historic community in which they arise" [1, p. 105].

The issue, however, has a broader dimension. What is forcing scientists to address the ethical, moral, or more broadly social problems regulating scientific knowledge and scientific or technical experience? Is it, perhaps, the possibility of a rapid growth of science and technology which gives rise to serious problems of social responsibility? Is it the absence of social institutions that would be able to ensure an effective and sufficiently flexible regulation of scientific research, making it possible to reduce the looming gap between the interests of science and its social and ethical consequences? Or, is it the lack of activity of such institutions? The famous Israeli-American sociologist Amitai Etzioni spoke in this context of "a sentimental, but non-viable sense of responsibility that is much needed, but which must be based on institutions that would support it" [2, p. 187].

3. The Need for a New 'Social Contract'

Several authors stress that the "social contract" between science, technology and society must be renewed. "Enthusiasm for such experiments exceeds our moral imagination" [2, p. 187], said the renowned philosopher and ethicist. But precisely this "enthusiasm for experiments" can provoke a conscious or unconscious attempt to manipulate the environment in which we live. A high regard for experimentation, so prized in science especially since the father of empiricism Francis Bacon, often victorious over our ability (before the start of experimentation) to assess the usefulness and safety of our experiments in the long run.

I chose the mental link of Amitai Etzioni mainly because Etzioni is a representative of the so-called theory of communitarianism. He, on the one hand, highlighted social needs, but also emphasized the need to maintain certain rules correctly and adhere to limits in the organization of all segments of society, including science and morality. He sought to find a meaningful balance between individual freedom and responsibility to the community. This involved in particular the issue whether our historically and socially defined society is able to actually assume and execute this responsibility, in other words, what the dominant range of its priorities is.

If the question is not established in this respect, or formulated clearly enough, one will hardly be able more or less convincingly to refute the concepts of scientism, technicism and socio-ethical nihilism. These deficient concepts tend to regard as "evil" whatever limits or prevents the direct operation of autonomous principles of science and technology. Thus, according to extreme scientism, moral principles necessary for the regulation of scientific knowledge are only to be derived from the very process of gaining understanding.

In principle, every thinking person will probably admit that scientific endeavor itself does not automatically entail a more humane type of human personality solely because that particular person is engaged in scientific activity. The contrary is true: "The proud pursuit of objectivity without a recognition of human limitations, and the dimension of subjectivity in the process, has proved to be a dead end that emits the stench of manipulation, loss of human dignity, and finally nihilism. Understanding the limits of reason will help us avoid the pitfall of 'scientism'" [3, p. 25].

However, there is a fairly widespread view in some scientific circles that in science as such there cannot be a legitimate application of ethical criteria, or even axiological approaches in general: science, according to these views, becomes a human value only when the content of its acquired knowledge and the

corresponding states of human consciousness are beyond any value characteristics [4]. One can say (somewhat simplistically) that the following reasoning is propounded as valid in these extreme, scientistic approaches: <In science there is only one problem: on the basis of existing knowledge, to create new knowledge>.

4. Towards a New Understanding of the Relationship between Science, Technology and Ethics

Although I do not feel competent to comment decisively on this relationship, I would like to express the opinion that the peculiarity of the current disputes about the possibilities of a humanistic orientation of science is, in the eyes of the layman, sometimes seen as an unacceptable convergence (or even an identification) of science and technology. Moral and humanistic values of scientific knowledge thus sometimes merge into one single complex although, in principle, they may be fundamentally different approaches to reality.

Technology is understood primarily as "a cultural resource" applied in the context of the acquisition of technical reality. The technique is thus examined within its own theoretical self-reflection in terms of whether it is suitable for satisfying human needs, whether its products can be utilized, measured, calculated, and can serve as useful tools.

For science, its basic mission is to "explore reality such as it is", as it exists independently of human interests and needs, and even in spite of these interests and needs. Access to real science, i.e. science in and "of itself", acutely raises the question of its preservation and reproduction in terms of technical and pragmatic expansion. Especially in the field of ecology and environmental sciences we see tangible expressions of a kind of inner science pathos, a pathos which has a special care for the salvation of being, existing independently of human consciousness and human will.

But who can understand these warnings, who can coordinate the efforts of scientists and technicians with an ethical starting point and the humanistic social preconditions for the formation of human society? Is there any social organization (Note: I do not say "institutions"), which is able to spontaneously provide an ethical evaluation of the results of the efforts of scientists and technicians? These considerations, it seems to me, lead to the conclusion that science itself does not need any moral control in the sense of this (hypothetical) social organization that could and should ensure the connection of science with technology and with the economy in order to harmonize all initiatives in a comprehensive understanding of social structure.

It is quite logical and legitimate (to some degree) that scientism and socio-ethical nihilism make their impact stronger, for example, in their attempts to establish "the special ethics of science" on the basis of objective knowledge that it itself postulates, that is, largely detached from social practice and the overall ethical values of humanity. However, an opposing view according to which there is no special ethics of knowledge that would be based on the concept of the objectivity of science, is also legitimate.

Ever since the ancient times humanity has developed science and technology in all its forms. Yet the question remains whether humans have thereby become better, happier and more content? Have they not succumbed to the tendency of believing that "human life has its meaning rather as an 'immediately-now', i.e. as an 'immediately-present'" [5, p. 122] at the expense of anticipating and hoping for something more complex and fulfilling?

5. The Limits of Science and the Realms of Art and Mystery

If we recognize the undeniable boundlessness of the goals of science, we cannot at the same time fail to notice the idea that there are certain human and social parameters (and not just an abstract sort of "cosmic" parameters) of human scientific knowledge. There is variety of ways of its expression, e.g. in terms of an active creative spirit and other ways of understanding it. In the future, science has to inevitably recognize the inherent limitations of the numerous mysteries of the spiritual world as these are experienced existentially by the human individuals. Such phenomena are cognitively processed relatively independently of science. So the realm of these relationships, which is inevitably marked by the idea of creativity brings us to the idea of the "complementarity" of science and art. Thus, more or less inevitably, we come to the conclusion that the ethical nihilism in science is equally incorrect and detrimental, as is the aesthetic nihilism – both destroying the ideal human being as a versatile, advanced, comprehensive personality. We should instead strive for the ideal of harmony: harmony of all that is "human in man", including science and art as basic forms of human activity in the spiritual realm. A key concept in this context is the concept of creation, creativity, as a specific approach to human reality.

A well-known theory pertaining this issue was authored by a British scientist and writer Charles Percy Snow recently. It is popularly known as the theory of "two cultures". According to Snow's classification, scientists fall under the category of 'new culture' - not only in the intellectual, but also in the anthropological sense - Culture created by science. Artistic intelligentsia continues to remain in the 'traditional' culture. This polarization of culture is in Snow's view an apparent loss for all of us, affecting us on practical, moral and creative levels of functioning [6].

Both science as well as the culture seek language with which to describe human experience. They are looking for concepts, words and images, exempting things and events from the captivity of silence and muteness. Human language condenses our intellectual reflection and interpretation into perceptible forms and shapes.

On the foundation of these relationships, which are inevitably marked by the idea of creativity, we get not only the idea of "complementarity" of science and art, but also the need for the formation of the so-called 'third culture', as John Brockman suggests [7]. Thus, more or less inevitably, we come to the conclusion that ethical nihilism imposed on science and aesthetic nihilism imposed on the arts are essentially equally wrong. We should rather strive for the embodiment of an ideal of harmony: the harmony of all that is human in each human being, including science and art as basic forms of human activity in the spiritual realm. A key concept in this context is the concept of creation, creativity, as a specific approach to human reality.

Only with a considerable dose of naivety could we say today that man approximates to these values and ideals. Our everyday reality convinces us otherwise – we are constantly moving away from them. However, it is also an indisputable fact that by means of art one may reach beyond rational clarity; art reveals to man the secrets that are inaccessible to rational scientific knowledge. So man needs art as an organic part of what is contained in him and in the world. Niels Bohr said concerning the relationship of science and art that: "The reason why art can enrich us lies in its ability to remind us of the secrets inaccessible to systematic analysis" [8].

The orientation of art on the emotional side of our nature and on the moral world of man produces in art a clearly pronounced sense of philosophical, moral and humanistic formulation of problems of life and death, good and evil, freedom and honor of the human [9].

These problems - as is the case of human beings - do not change as quickly as the scientific discoveries; they are in some sense eternal, as is eternal the art that expresses them. Art is not only a kind of auxiliary instrumentarium of science. Art directly affects the development of creative forces in man. In this context, we should remember Albert Einstein who appreciated the effect of art on the emotional side of man, without which no science can fully exist. He said: "I personally ascribe to a work of art a sense of supreme happiness. I drew from them more mental bliss than from any other area ... Dostoevsky gives me more than any scientific thinker, more than Gauss" [10, p. 81]. Einstein obviously did not want to degrade the importance of one of the greatest mathematicians and physicists of all time, but merely wished to open the way to the point of view that creativity is a higher social and moral determination of man. However, it often requires an internal incentive or an inspiration that can come quite unexpectedly from another area of human self-expression. Revealed in it are the essential forces of man, his abilities and spiritual riches. It is here where we find a possibility of creating new starting points towards understanding the limited sphere of science, technology, ethics and artistic creation.

6. Human Creativity as a Platform for Harmony

The concept of "creativity" is not a magic formula; it must be understood more broadly, not only as a scientific or artistic creativity, but also as a development and objectification of all spiritual forces of man. The layout of our own lives is a kind of creativity for which a man takes full responsibility. Creativity understood in the broad sense (as a social and historical dynamic of the objectification of creative forces and human potential) is a discovery of the moral and psychological world of human personality. Through creativity, we deliver and develop not only accumulated knowledge, but also moral values. Only creativity is able to become a platform for harmony in the process of the convergence of science, technology and ethics.

According to the Russian (or more accurately the Estonian and Estonian-Jewish) philosopher, scholar of semiotics and cultural theorist, Yuri Mikhailovich Lotman [11], the current semiotics of art and the semiotics of culture on the one hand, allows one to see a work of art as a peculiarly man-made intellectual shape, and on the other hand to look at culture as a natural and historically-formed mechanism of collective reason, which disposes collective memory and is able to perform intellectual operations. It thereby ceases to be human intellect, something special, and this is an important step in the development of science. Lotman's 'artonika' - as he called a cybernetic artistic text - may well result not only in a scientific theory but also technical and practical possibilities. It is hoped that the time will come when a careful examination of artistic phenomena and mechanisms of culture will become common even for cybernetics, and for the creators of new forms of technology. The need for a synthesis in this area is also demonstrated by the fact that an increasing number of modern scholars devote themselves to the study of "transmediality" (storytelling through various media, each of which somehow extends the story) and of cultural "autocomunication" (such as communication within a single culture space).

7. Conclusion

Searching for lost harmony has been the leitmotif of the relationship between scientific knowledge and ethics, between technology and morality, between science and other forms of perception and explanation of the world, such as art, ever since the era of Humanism. The humanists "became an important force of reform both in the Catholic and Protestant environments" [12, p. 184] changing the nature and content of education, opening the way for a more secular vision of reality, while its holistic nature and interdependencies. Our responsibility today is to embrace this quest. This continuing search, which we might label 'the search for a synthesis', in fact permeates the whole history of human culture. The story of the relationship between science, technology and ethics acquires a new dimension when seen against this backdrop.

References:

[1] VALCO, M., KRALIK, R., BARRETT, L.: Moral Implications of Augustine`s Philosophical and Spiritual Journey in his Confessions. *Communications - Scientific Letters of the University of Zilina*, vol. 17, No. 2, 2015, 103-108. ISSN 1335-4205.

[2] ETZIONI, A.: The Normativity of Human Rights is Self-Evident. *Human Rights Quarterly,* vol. 32, No. 1, 2010, 187-197, ISSN 0275-0392; See e. g.: JUROVÁ, J.: On Etzioni's concept of a responsive community. *European J. of Science and Theology,* vol. 12, No. 3, 2016, 71-80. ISSN 1841-0464.

[3] VALCO, M., VALCOVA, K.: The Epistemological Challenge of Kierkegaard's Truth is Subjectivity Principle. *Communications - Scientific Letters of the University of Zilina,* vol. 16, No. 3, 2014, 25-28. ISSN 1335-4205.

[4] HANES, P. and MASARIK, M.: Complementarity of Science and Theology. *European J. of Science and Theology,* vol. 12, No. 6, 2016, 5-20, ISSN 1841-0464.

[5] DUPKALA, R.: Recentivism of J. Banka as "practicing philosophy in harmony with the Spirit of the Age" (in Slovak). *Filozofia*, vol. 63, No. 2, 2008, 122-130. ISSN 0046-385X.

[6] SNOW, C. P.: *The Two Cultures*. London : Cambridge University Press, 1959; SNOW, CH. P.: *The Two Cultures. A Second Look.* London: Cambridge University Press, 1963. SNOW, CH. P.: Across the Great Divide. In: Nature *Physics* 5 / 2009, 309.

[7 BROCKMAN, J.: *The Third Culture. Beyond the Scientific Revolution*. New York: Simon & Schuster, 1995. ISBN 0-684-82344-6.

[8] BOHR, N.: *Atomic Physics & Human Knowledge*. London: Chapman & Hall, 1958.

[9] Kondrla, Pavlikova and Kralik point out that the Danish philosopher Soren Kierkegaard highlighted the same ideas in the 19th century. See: KONDRLA, P. and PAVLIKOVA, M.: From formal ethics to existential ethics. *European J. of Science and Theology*, vol. 12, No. 3, 2016, 101-111. ISSN 1841-0464; KRALIK, R.: Kierkegaard and his influence on Tillich's philosophy of religion. *European J. of Science and Theology*, vol. 11, No. 3, 2015, 183-189. ISSN 1841-0464.

[10] EINSTEIN, A.: *My View of the World* (in Czech). Praha: Ceskoslovensky spisovatel, 1961.

[11] LOTMAN, J. M.: *The Structure of Artistic Text* (in Slovak). Bratislava: Tatran, 1990. ISBN 80-222-0188-X.

[12] VALCO, M.: The Roots and Nature of Luther's Theological understanding of 'Missio Dei' in the Context of Reformation Agenda. *European J. of Science and Theology,* vol. 12, No. 4, 2016, 181-188. ISSN 1841-0464.

Hubert Jurjewicz*

A NEUROETHOLICAL STUDY OF HUMAN BEHAVIOR IN THE CONTEXT OF MEDITATION IN RELIGIONS

A neuroethological examination of the behavior and the cognition of nonhuman and human beings shows a connection between biological specializations to social behavior. It shows that ancestral organs and manners are usually regulated differently, duplicated, and repurposed so that an animal can act in a particular way. A neuroethological approach shows that highly specialized mechanisms have changed over time to translate immediate parallel circuits and social contexts that have changed over time. According to this approach, highly specialized mechanisms have changed to enable translation of perceived nonsocial and social signals into partially interconnected nonsocial and shared motivational pointers that have together created general-purpose techniques that command behavior. Dissimilarities in social conduct between species and between members of a species are partly due to neuromodulatory regulation of neutral circuits that appears to be controlled partly by genetics. The intraspecific difference in social behavior is important as it assists an animal to adapt to a particular situation. This review suggests that neuroethological approach to human behavior can assist in the understanding of human behavior.

Keywords: *Neuroethological, human behavior, meditation, religions.*

1. Human Behavior and Analysis of Consciousness

Responsiveness and sensitivity to information about other people are important for survival [1, pp. 960-967]. They can lead to human health, financial success, and other benefits. People navigate the social world through tracking the behaviors of other people and forming a model of their emotions and intentions. They actively search for and share information about other people in order to alter their own behaviors in light of the behaviors of other people. The specializations for social actions show rich evolutionary history to adjustment to life in a group. Just like a number of nonhuman primates, human beings live in groups characterized by patterned social conducts such as cooperative foraging, imitation, grooming, mating, competitive interactions, and ritualized courtship. Therefore, corruption of social environment affects individual animal or human as well as their reproductive success.

A complete theory of consciousness does not exist [2, p. 11]. Both materialism and dualism are wrong because they deny the existence of consciousness in the physical world. Therefore, computationalism, behaviorism, readiness potential, materialism, subjectivity, and epiphenomenalism hold false claims. Epistemic objectivity is not precluded by ontological subjectivity [3]. Consciousness creates observer-relative phenomena but consciousness itself is not observer-relative. It consists of sentience, feeling, or awareness of ontological subjectivity, qualitativeness, intentional causation, intentionality, and unified conscious field. Neurobiological processes in the lower side of the brain determine all conscious states recognized as higher-level features in the brain.

Consciousness consists of all states of awareness, sentience, or feeling. It starts from the time an individual wakes up from a dreamless sleep to the time he/she sleeps again, dies, or becomes unconscious. Consciousness has many features. Five most important features are qualitativeness, ontological subjectivity, unity, intentionality, and intentional causation [2, p. 24]. Intentional causation and intentionality enable people to cope with the environment.

2. The Failure of Sociobiology

Apart from the need for survival, Darwinian revolution added a diachronic element to the Aristotelian teleological cause. The diachronic element is appropriate for a particular period only. Darwinian thought, however, cannot be used to explain everything. In the past, sociologists used sociobiology to explain human morality, civilization, culture, philosophy, and others.

* **Hubert Jurjewicz**
College of Saint Elizabeth, Morristown, USA
E-mail: hjurjewicz@gmail.com

E.O. Wilson (1975) developed the theory based on Darwinism. However, even though it is a theory based on Darwinism, sociobiology failed to do what it was created for.

Sociobiology failed because, it tried to clarify specific elements of human society and culture. An explanation through sociobiology had to take into account the fact that a key change in human gene pool has not happened in the past 30,000 years. It had to consider the fact that there have been enormous changes in the human society in the last 30,000 years. There has been a rise of things like communism, fascism, democracy, and enlightenment. There is thus no relationship between the social reality and the social evolution. Even when the number of years is reduced to the past 3000 years, sociobiology still lacks validity. It cannot explain why there have been major changes yet there have been no key changes in the gene pool of human beings.

Wilson concentrated on cultural universals to strengthen sociobiology. He concentrated on incest taboo as all societies have incest taboos. Even though sociobiology explained the existence of taboo, cultural anthropologists refuted the explanation claiming that cultures do not have similar incest taboos. In some cultures, it is wrong to marry your cousin while it is allowed in others. However, all societies forbid father-daughter, brother-sister, and mother-son sexual relations. Despite this fact, sociobiology cannot be said to have succeeded because it inadequately explained universal prohibition. Humans have no internal inhibition for a sexual act with people they are related with. If they had, there would be no need for a taboo.

The lack of sexual desire between people who are closely related is due to aversion. Studies have shown that children in one Israeli kibbutz have a tendency to have no sexual desires for other persons in the same kibbutz. They, however, tend to develop strong sexual desires for persons raised in other kibbutz as close proximity causes sexual aversion during development. Sexual aversion gives incest taboo, causal or mechanical explanation. The importance of biparental reproduction gives the incest its functional explanation. However, the functional explanation does not offer specific intentional content to the prohibition. Furthermore, the power of prohibition is not given as the tendency to act in a particular manner lacks.

3. Evolution and Social Behavior

Social conduct places unique and strong strain on the nervous system. Social complexity of a species correlates with the forebrain volume. This is after correction with body size has been made. Social complexity of neural mechanisms is related to diets high in dependable calories-rich foods. Key growth of hominines' brains during the evolution concurs with the creation of novel conducts that increased calories in diets [4, p. 42].

Social behavior tends to depend on homologous neural mechanisms. New conducts can be created through elaboration or repurposing ancestral mechanisms, which served a different purpose in the past. For example, electrosensory receptors, which are part of the lateral line systems of mormyrid fishes, develop to support detection of motion and orienting [5, p. 329]. Cerebellum, which processes feelings from lateral line system is enlarged in mormyrid fishes but is absent in their ancestors because they lacked a social function served by the cerebellum. Evolution of neuropeptide oxytocin (OT) is another example of repurposing a feature for a social function. Tolerance and approach enhancing roles of OT ancestors of vertebrates evolved to support social bonding and parental behavior in mammals [6, p. 2259-2271].

General-purpose mechanisms support sociality in some cases while in other cases it might require special-purpose mechanisms. General-purpose organs are utilized across both social and nonsocial domains while special purpose organs serve only a particular role in the social domain. Specialized organs like electrosensory receptors in mormyrid fishes are usually found in the input stages of social processing but general mechanism is more in the input stages of social processing, but generalized organs are high in number near output stages of effective control. In contrast, a mixture of generalized and specialized organs characterize transitional computational phases of processing, which interpret socially definite inputs into motivational indications, which guide decision making and learning to generate behavior [7, p. 2270].

4. Nonsocial and Social Behaviors

Reinforcement drives a large number of human conducts. Human and nonhuman primates forage to acquire various rewards. All motile and heterotrophic life forage as foraging is the most basic and primitive behavior. Foraging approaches are under strong pressure to be changed or modified for maximization of returns in investments. Usually, animals look for foods that are distributed sparsely. Food materials are depleted as animals continue foraging. When a number of food materials go down, the consumption rate of energy slows down. At this point, animals can decide to move to a new patch. However, due to circumstances like the costliness of doing so and the uncertainties accompanying the act, animals, which include people may decide to abandon the decision to move into another patch. The same principle is applicable to many other situations facing people as resources are sparsely distributed. According to Charnov's Marginal Value Theorem, abandonment of a patch should be done when there is a fall in the rate of consumption.

Organisms can forage information. Like other forms of foraging, information foraging has costs and opportunities. Costs like missed opportunities to sleep, drink, and eat, as information- seeking behaviors usually require someone to act in a particular manner. Social information has either negative or positive reinforcement value. Therefore, the foraging theory

can be utilized to study the acquisition of social information. According to several studies, both nonhuman, and human primates constantly seek social information. They find social stimuli to be intrinsically rewarding. Other social stimuli are more reinforcing and interesting than others. For example, human infants stare for long at faces as compared to the time they take to gaze at nonfaces similar to the real faces. Nonhuman primates have been found to gaze for long towards higher-ranking animals as compared to lower ranking animals. Therefore, brain of most animals have developed mechanism to acquire and utilize social information, these show that social information is important and that it is worth to forage.

Another similarity between nonsocial and social behaviors can be found through assessment of behavioral reactions to social and predators' threats. In both cases, a looming threat causes reflexive behaviors like defensive aggression, freezing, and escape behavior. A distant threat causes the vigilant exploratory conduct in the object that is threatened. For example, a rhesus macaque will choose to gaze at a picture of a dominant monkey other than of the picture of the subordinate, when given a chance. In spite of this fact, low-status monkeys usually avert their gaze on the faces of high-status monkeys when confronted. This kind of behavior is a reminder of exploratory when there is a distant threat and avoidance behavior when there is a real threat. Many basic behavioral strategies that are created from nonsocial settings are also applicable in social settings.

5. Reflective and Reflexive Empathy in Humans and Animals

Reflective and reflexive mental state is linked to and plays an important part in the promotion of social bonds. Individual difference in the enthusiasm to attend to social challenges and social interactions is positively correlated with measures that are associated with the formation of social bonds. What an individual thinks or knows is usually confounded because reflective processes related with higher levels of ToM and linked closely to reflexive, automatic processes [8, p. 6:224]. Even though, humans are conscious of the differences between their own and other's mental states, they are usually unaware of the basis of their awareness or feelings. For example, both goal-directed behavior and response to a gaze activate a more primitive side of the brain as well as higher cortical sides like prefrontal cortex. This is true of intended behavior.

Even though people can consciously access their reflections on whether their actions are intentional or accidental, many neuronal reactions, which contribute to the ultimate decision, are usually subconscious. In both monkeys and humans, mirror neurons that are in the lower parietal lobule become activated when a person acts in a particular way or when he/she observes another person performing them. Many neurons start to be active before the other person performs the action in reality. This suggests that neurons encode acts as well as actor's intentions [9, p. 28]. Our ability to identify gaze as informative element or to consider whether a conduct is intended or not depends on automatic and reflexive neuronal activity that people are largely ignorant about.

Empathy also has similar impacts. Explicit and reflective empathy consist of the capability to identify emotional states such as fear or grief in others without the necessarily going through the same emotion. Reflective empathy causes activity of neurons in higher part of the brain like the cortex and in the primitive parts of the brain like the brainstem, endocrine, midbrain systems, which are associated with social attachment, reactivity, and reward [10, p. 37]. Even though individuals can distinguish between their own emotions from those of others, representation of emotions likes disgust, shame, and pain cause activation of the same areas of the brain they are experienced. Being nice to and feeling sympathy for other people is emotionally rewarding as it causes the release of dopamine, a neurotransmitter associated with individual reward. Neuropeptides are also activated to release oxytocin associated with maternal attachment, empathy, trust, and sensitivity towards others' affective states [11, p. 331–336].

Similar to this, is reflective imitation. Reflective imitation involves the ability of an animal or a human being to recognize the intentions and the goals of others and the view that in order to acquire the same goal one ought to copy the actions of another individual. Just like great apes, human depend greatly on this ability [12, p. 31-38]. A large number of people are not aware that they continuously mimic others. People have an unconscious and reflexive tendency to copy traits, mannerisms, and postures of people they are in interaction [13].

6. A Physiology of Fear

A frightened individual experiences various physiological changes. One of these common changes is the standing up of hair. Other changes include the stimulation of sympathetic nervous system in cases of freeze, fight, or flight. A neurologist by the name Melvin Konner noted that nerve net, which is balanced by the braking power of the parasympathetic systems, starts an increase in heart rate, blood pressure, and flow of blood to the muscles. It also reduces the flow of blood to the viscera. The changing balance further sparks reflexive emptying of bowels and bladder to prepare an animal for a flight or fight. However, this may humiliate an individual who is found at the verge of a fight he/she cannot handle [14, p. 14].

In addition, fear instigates release of hormones like adrenaline, cortisol, and Corticotropin-releasing hormone (CRH). Neurologists have been able to manipulate these hormones in the laboratory to create a more or less fearful behavior in mammals. Scientists have noticed that insertion of a gene, which makes

CRH on a mouse, produces a very fearful mouse while removal of the gene from the mice led to an extremely fearless mouse [15, p. 3567-3577].

All mammals have adaptive instincts like flights or fight but are old-brain systems situated in brain stems. On top of this midbrain, systems are limbic emotional circuits. Emotional neuroscience has identified seven key emotional systems, which mammals fear. These are care, fear, rage, lust, play, seeking, and panic. Each has distinctive pathways via the brain, specific hormones, and specific neurotransmitters. These characteristics cause specific mammal behaviors. For example, fear has a neurocircuitry, which goes from amygdala via the hypothalamus to periaqueductal gray (PAG), to the brain stem, and then out via the spinal cord. Fear in human and other mammals is regulated largely in the amygdala. Joseph E. LeDoux mapped the pathway by which memory and fear work in the cycle to develop conditioned learning [16, p. 27]. Therefore, when an individual relates a dog with aggression, his/her brain will cycle through the same circuit to cause behavior. Fear is situated in the same place in mammals.

7. Darwinian Roots of Horror

Just like other biological traits, fear is subjected to evolution. Mammals have heritable dispositional levels of timidity and fear. The levels of shyness can be promoted through breeding to create populations that are more fearful. For example, rats that were fearful were bred. In only ten generations of breeding, scientists had 10 times more fear in the population. The results of this study confirmed that earlier discoveries by Darwin himself discovered that chimps feared snakes. He repeatedly took fake and real snake to a zoo in London to study the reaction of the chimps to the fake and the real snake. He explained the existence of fear among the chimps by pointing to the rudimentary taxonomic recognition system, which is wired into animals.

8. Meditation

Meditation is a contemplative practice that exists in almost all key religions [17]. Meditation cultivates basic human qualities like compassion, love, mindfulness, sense of caring, a clear mind, and emotional balance. These are qualities, which remain latent if the effort is not put to develop them. Meditation also assists people to familiarize with a more serene and flexible situation. It is an uncomplicated activity; it does not require workout attire or equipment. A meditator starts meditation by taking a relaxed physical posture. He/she is neither too relaxed nor too tense. A meditator expects that the meditation will cause self-transformation and achievement of the wishes and the desires of other people. After meditation, the practitioner ought to stabilize his/her mind because it is disorderly. The mind is full a flow of inner chatter after meditation. Mastering the brain involves liberating it from inner confusion and automatic way of being.

a) Focused-Attention Meditation

While at Emory University, Wendy Hasen-camp and her team members utilized brain imaging to spot neural networks that become active due to focused-attention meditation. In the study, participants were requested to concentrate their focus on the sensation they create by breathing [18]. During meditation, participants' minds wandered away from the focus. However, they realized this and restored their focus on the rhythm of exhaling and inhaling. The practitioners were required to press a button to signal the wandering of the mind. Researchers recognized four stages of a cognitive cycle in this particular study on focused-attention meditation. They are the wandering of the mind, the time of getting aware of the distraction, period of redirecting the direction, and beginning focused awareness.

Each phase among the four stages consists of certain brain networks. Default-mode network (DMN) is motivated in the first part of the cycle when there is a distraction. DMN consists of areas of the posterior cingulated cortex, inferior parietal lobe, medial prefrontal cortex, lateral temporal cortex, and precuneus. DMN is activated when the mind wanders. It plays a general part in updating and building inner models of the world based on long time memories about others and oneself. Salience network regulates subjectively perceived feelings that can distract an individual. It plays an important role in the detection of new events and switching of activities during mediation. For instance, it may alter concentration away from the default-mode network. In the second phase, a meditator becomes aware of the distraction. The areas of the brain that are involved are the anterior cingulated cortex, anterior insula, regions known as salience network.

The third phase involves areas like lateral inferior dorsolateral prefrontal cortex. The organ ensures that an individual develops back attention by causing detachment between the areas and distracting stimulus. The last, fourth stage consists of dorsolateral prefrontal cortex, which maintains a high level of activity as the practitioner focuses on an object like school.

In another study at Wisconsin, researchers realized that practitioner's level of experience influenced the rate and the pattern of activity in the brain. Well-experienced meditators show more activity in attention-relate parts of the brain when contrasted with inexperienced meditators. Advanced meditators seemed to have developed skills that enabled them to acquire a focused state of mind without much difficulty.

b) Open-Monitoring Meditation

Mindfulness necessitates a meditator to concentrate every sound or sight and track inner self-talk and internal bodily sensations [19]. The meditation makes a person become aware of everything surrounding him/her but encourages him/her to avoid thoughts or perceptions returning when the mind wanders

away. Consciousness of what is happening in the surrounding develops with time. It helps an individual who has gone through a meditation to develop a sense of psychological well-being. Usual irritants in the surrounding lose their disruptiveness. They become less disturbing.

In a study to measure mindfulness attention at Wisconsin, participant were required to perceive two numbers that were presented rapidly on the screen, when a second number appeared after about 300 milliseconds after the first, the participants did not detect them. They could easily identify the second number if the number appeared after the first number had stayed for 600 milliseconds. The attentional blink, which is a phenomenon that exists when an individual is unable to detect a second object showed that the brain lacks the capability to process two stimuli that are presented to an observer at close interludes. However, mindfulness training can assist people to notice more than one stimulus. Mindfulness practice helps an individual to cultivate nonreactive forms of sensory awareness that cause a reduction in attention blink.

Being conscious of a disagreeable sensation can lower maladaptive emotional reactions. In a more advanced mindfulness meditation known as open presence, the mind is relaxed, calm, and not focus on anything but is completely free of dullness and excitation. The meditator is open to experience without the need for interpretation, rejection, change, or ignorance of a painful sensation. The intensity of the pain does not reduce after a meditation. However, meditation assists an individual in developing the ability to manage and buffer physiological reactions like the release of stress hormone or inflammation. Expert meditators' brains are different from those of other people. There is a reduced activity in anxiety-related regions of expert meditators' brain. Anxiety-related regions include the amygdala and insular cortex. A meditator's brain becomes more accustomed to stimulus more quickly than novice does.

c) Compassion Meditation

The third form of meditation is the one, which cultivates feelings and attitudes of compassion and loving kindness towards people. It cultivates love and compassion even to strangers, enemies, or people who are not close relatives. It assists a meditator to develop an awareness of the needs of other people and then experience a compassionate and a sincere desire to assists. In order for this to happen, a meditator ought to have the feelings of the other people. However, even if an individual has developed feelings that are similar to those of a suffering person, the individual is not expected to develop the compassionate mindset straight away. Unselfish desire drives this type of meditation. It thus leads people to want to assist people who are suffering.

A meditator starts by first focusing on unconditional feeling of love and benevolence for other individuals. Studies have shown that insular cortices and secondary somatosensory, which usually take part in empathetic and any other emotional response is activated more among experts as compared to among novice. This tendency showed that experts have an ability to understand and share the feelings of other people without becoming overwhelmed by emotions. Furthermore, compassion meditation causes more activity in areas like medial prefrontal cortex, temporoparietal junction, and superior temporal sulcus.

9. Conclusion

Neuroethological approach to human behavior proves to be useful also in contemporary attempts to understand the nature of meditation. A measurable changes in the brain and nervous system has been observed in subjects as they entered and persisted in meditative mode. Researchers recognized four stages of a cognitive cycle in a study of focused-attention meditation. They proved that mindfulness practice in an open-monitoring meditation model can help an individual to cultivate nonreactive forms of sensory awareness that cause a reduction in attention blink. They have also pointed particular areas of cerebral activity among subjects practicing compassion meditation model.

References

[1] BAREFOOT, J. C., GRONBAEK, M., JENSEN, G., SCHNOHR P., PRESCOTT, E.: Social Network Diversity and Risks of Ischemic Heart Disease and Total Mortality: Findings from the Copenhagen City Heart Study. *American J. of Epidemiology,* vol. 161, No. 10, 960-967, 2005. ISSN 0002-9262.

[2] SEYFARTH, R., CHENEY, D.: *In the Light of Evolution: Volume VII: The Human Mental Machinery.* Washington, D.C. : National Academy of Science, 2014. ISBN 978-0-309-29640-3.

[3] As Valco and Valcova correctly point out, if "the subject and subjectivity become indifferent, the truth also becomes indifferent," therefore, "truth should rather be understood as an objective uncertainty appropriated passionately by the inward reflective experience of love and faith of the self." VALCO, M. & VALCOVA, K.: The Epistemological Challenge of Kierkegaard's Truth is Subjectivity Principle. *Communications - Scientific Letters of the University of Zilina,* vol. 16, No. 3, 2014, 25. ISSN 1335-4205. Subjectivity is intimately related to authenticity and existential focus, for an authentic human being is "always oriented towards the singular and unrepeatable aim." KONDRLA, P. & KRALIK, R.: Authentic being and moral conscience. *European J. of Science and Theology*, vol. 12, No. 4, 2016, 158. ISSN 1841-0464. On these topics also see: VALCO, M., KRALIK, R. & BARRETT, L.: Moral implications of Augustine's philosophical and spiritual journey in his Confessions. *Communications - Scientific Letters of the University of Zilina,* vol. 17, No. 2, 2015, 103-108. ISSN 1335-4205; KONDRLA, P. & PAVLIKOVA, M.: From formal ethics to existential ethics. *European J. of Science and Theology*, vol. 12, No. 3, 2016, 101-111. ISSN 1841-0464; VALCOVA, K., PAVLIKOVA, M. & ROUBALOVA, M.: Religious Existentialism as a Countermeasure to Moralistic Therapeutic Deism. *Communications - Scientific Letters of the University of Zilina,* vol. 18, No. 3, 2016, 98-104. ISSN 1335-4205; PAVLIKOVA, M.: Despair and alienation of modern man in society. *European J. of Science and Theology*, vol. 11, No. 3, 2015, 191-200. ISSN 1841-0464; KRALIK, R. & TOROK, L.: The moment Kierkegaard's attack upon Christendom. *European J. of Science and Theology*, vol. 12, No. 3, 2016, 45-53. ISSN 1841-0464.

[4] WRANGHAM, R.: *Catching Fire: How Cooking Made Us Human.* Philadelphia: Basic Books, 2009. ISBN 978-0-465-02041-6.

[5] KATZ, P. S.: Comparative Neurophysiology: An Electric Convergence in Fish*. Current Biology,* vol.16, No. 9, 2006, R327-R330. ISSN 0960-9822.

[6] YOSHIDA, M. et al.: Evidence that Oxytocin Exerts Anxiolytic Effects via Oxytocin Receptor Expressed in Serotonergic Neurons. In Mice. *J. of Neuroscience,* vol. 29, No. 7, 2009, 2259-2271. ISSN 0270-6474.

[7] WATSON, K. K., PLATT, M. L.: Social Signals in Primate Orbitofrontal Cortex*. Current Biology,* vol. 22, No. 23, 2012, 2268-2273. ISSN 0960-9822.

[8] HECHT, E.E., PATTERSON, R. B., BARBEY, A. K.: What can other Animals Tell us about Human Social Cognition? An Evolutionary Perspective on Reflective and Reflexive Processing. *Frontiers in Human Neuroscience* [online], vol. 6, 2012. Available on the Internet: http://dx.doi.org/10.3389/fnhum.2012.00224

[9] RIZZOLATTI, G., FABBRI-DESTRO, M.: The Mirror Neuron System*. Handbook of Neuroscience for the Behavioral Sciences*. New York: Wiley, 2009. ISBN 978-0-470-08355-0.

[10] DECETY, J.: The Neuroevolution of Empathy. *Annals of the New York Academy of Sciences,* vol. 1231, No. 1, 2011, 35-45. ISBN 978-1174957048

[11] CARTER, C. S., GRIPPO, A. J., POURNAJAFI-NAZARLOO, H., RUSCIO, M. G., PORGES, S. W.: Oxytocin, Vasopressin and Sociality. *Progress in Brain Research,* vol. 170, 2008, 331-336. ISBN 978-0-12-804216-8.

[12] BUTTELMANN, D., CARPENTER, M., CALL, J., TOMASELLO, M.: Enculturated Chimpanzees Imitate Rationally. *Developmental Science,* vol. 10, No. 4, 2007, F31-F38. ISSN 1467-7687.

[13] For a good analysis of the potential of human communities to shape common traits or "shared values" among humans, see: JUROVA, J.: *European J. of Science and Theology*, vol. 12, No. 3, 2016, 101-111. ISSN 1841-0464.

[14] KONNER, M.: *The Tangled Wing*. New York: Times Books, 2002. ISBN 0-7167-4602-6.

[15] BRUCHEY A. K., LIMA, G.: Brain Activity Associated with Fear Renewal. *European J. of Neuroscience,* vol. 24, No. 12, 2006, 3567-3577. ISSN 1460-9568.

[16] LEDOUX, J. E.: *The Emotional Brain.* New York: Simon and Schuster. 2002. ISBN 978-0670030286; *The Synaptic Self*. New York: Viking, 1996. ISBN 0670030287.

[17] SLIVKA, D.: Hebraic Scriptural Hermeneutics in the Ancient Hellenistic World as the Basic Approach of Early Christians. *European J. of Science and Theology,* vol. 11, No. 5, 2015, 87-96. ISSN 1841-0464.

[18] RICARD, M., LUTZ, A., DAVIDSON, R. J.: Mind of the Meditator. *Scientific American*, vol. 311, No. 5, 2014, 38-45. ISSN 0036-8733.

[19] CHANG, S., BRENT, L., ADAMS, G., KLEIN, J., PEARSON, J., WATSON, K., PLATT, M.: Neuroethology of Primate Social Behavior. *Proc. of the National Academy of Sciences*, vol. 110, Supplement 2, 10387-10394. Jefferson Science Fellowships, April 3, 2013.

[20] BAREFOOT, J. C., GRONBAEK, M., JENSEN, G., SCHNOHR P., PRESCOTT, E.: Social Network Diversity and Risks of Ischemic Heart Disease and Total Mortality: Findings from the Copenhagen City Heart Study. *American J. of Epidemiology,* vol. 161, No. 10, 960-967, 2005. ISSN 0002-9262.

Alena Haskova – Silvia Mandulakova – Dirk Van Merode*

PROBLEMATIC ASPECTS OF TECHNOLOGY EDUCATION IN SLOVAKIA

In current technology-based societies, understanding fundamental scientific concepts and theories and the ability to structure and solve scientific problems are more important than ever before. Understanding of science and technology is central to young people's readiness for their life in the current society. Moreover, each society, not only the technology-based one, needs creative technicians and engineers. That is why technology education has long been an integral part of (school) education although various societies and countries carry out this type of education in different ways. The paper presents the results of various researches and studies aimed at the current development and quality of technology education done mainly at lower secondary schools in Slovakia where technology education was taught within the school subject of the same name - technology education before the school reform (2008), while currently it is taught as part of the school subject called technology. The paper focuses its attention on analyses and discussions of the most problematic aspects of this development.

Keywords: *Technology education, school subject technology, lower level of secondary schools (ISCED 2), quality assurance of the education.*

1. Introduction

Technology education can in general be defined as the study of various types of techniques and technologies with the aim to develop and acquire practical skills, attitudes, understanding and knowledge related to technical occupations in relevant sectors of economic and social life. Technology education offers children and young people challenges how to make sense of the acquired theoretical knowledge and to realise the link between the theoretical subjects taught at school and technical products they come across in everyday life. Moreover, it serves as a means of preparation for an occupational career because it offers a specialised training for initial employment.

Before 1995 technology education in Slovakia was a part of the school subject called *work education*. In 1996 this subject was modified to subject called *technical education*, followed by yet another change introduced by the curricular reform in 2008. Technology education at schools (ISCED 2) has since then been taught predominantly within the school subject called *technology*. In the technology-based society, which we are currently indisputably living in, one would logically expect science and technology education to be prioritised in primary and secondary schools, and students to be interested in continuing their career education in various technical study fields. But the opposite is true. For quite a long time we have been witnessing that science, technology and engineering study fields have been the least favoured disciplines and students have not been keen on studying them.

2. Interest of the youth in STEM subjects

In the Slovak education system physics, chemistry, biology and mathematics have been considered as science education, but very often informatics together with technology have also been incorporated into the content of this term. To avoid ambiguity in the use of the terms technology education and informatics education, the acronym STEM becomes more frequently used instead of the term *science / natural sciences*. In this way, we follow the approach adopted by West European countries where the term STEM education has already been successfully established as the official acronym for education in science, technology, engineering and sciences.

Natural sciences and school subjects related to technology have not been very popular school subjects not only in Slovakia but world-wide for a long time. The problem of a declining interest in science and technology studies has been reported by most of the OECD countries. That is why the Global Science Forum was

* [1]Alena Haskova, [1]Silvia Mandulakova, [2]Dirk Van Merode
[1]Faculty of Education, Constantine the Philosopher University in Nitra, Slovakia
[2]Technology and Design, Campus de Nayer, Thomas More Mechelen-Antwerpen University College, Sint-Katelijne-Waver, Belgium
E-mail: ahaskova@ukf.sk

addressed to validate these findings and analyse the reasons of this state. The results of the investigation proved that the problem of low interest in STEM subjects and STEM-related careers among the youth is particularly acute in West European countries though the demand for science and technology graduates significantly grows there. In contrast to this situation, in many African and Middle East countries the interest of the youth in STEM is very high, but the quality of STEM teaching is at a low level there ([1] and [2]).

A survey which we carried out among grammar school students in Nitra region showed that common belief of unpopularity of the STEM subjects is not fully true and the situation is not so "single-coloured" (Fig. 1).

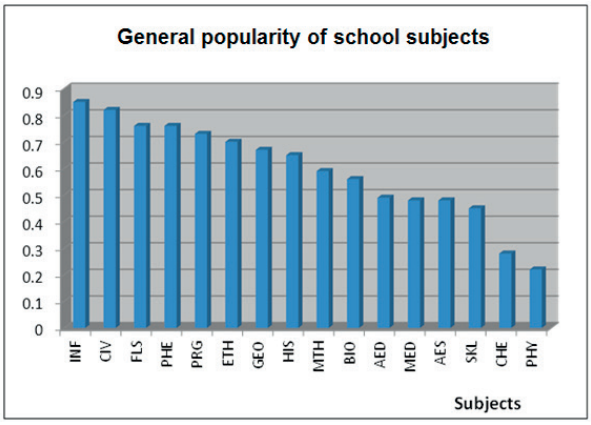


Fig. 1 General popularity of school subjects among grammar school students Abbreviations: INF - Informatics, CIV - Civics, FLS - Foreign Languages, PHE - Physical Education, PRG - Programming, ETH - Ethics / Religion, GEO - Geography, MTH - Maths, BIO - Biology, AED - Art Education, MED - Music Education, AES - Aesthetics, SKL - Slovak Language, CHE - Chemistry PHY - Physics (Source: [3])

The results of the survey can be summarised in the following main findings:

- Statements about unpopularity of STEM subjects and lack of students' interest in them were confirmed in the case of chemistry and physics. The subjects related to computer sciences (informatics and programming) were identified as the most popular ones (informatics – the average coefficient of its general popularity 0.85, programming – 0.73). The disputability of this finding is commented below in the context of young people's interests.
- Maths, which is, together with chemistry and physics, generally perceived as one of the least popular subjects, was ranked approximately in the middle of the "popularity rate". A very interesting finding in this context is the popularity position of the mother tongue (Slovak language). The obtained data rank is at the same level of popularity where the science subjects are (chemistry and physics, the average coefficients of their general popularity being 0.28 and 0.22 respectively).
- Another popular myth claims that the lack of popularity of particular school subjects has its roots in students' learning failures. But according to the statistics of the State school inspection, the highest number of exam retakes to continue studies in a higher grade of school education are usually from foreign languages, which are perceived as a very popular school subject, while in the case of physics and chemistry, the least popular subjects, the number of these exams is quite low.

3. Interest of the youth in STEM related careers

There is a broad spectrum of phenomena which influence personal choice of a study field. They range from family backgrounds through school experiences up to one's salary expectations. Furthermore, the choice of the study field is influenced by many social aspects too (in relation to the choice of science and technology related professional career these can reflect, e.g. status of science and technology in the society, image of science and technology professions, teacher training and continuing professional development).

The scheme of the three main categories of key factors determining students' career interest, motivation and choice is presented in Fig. 2.

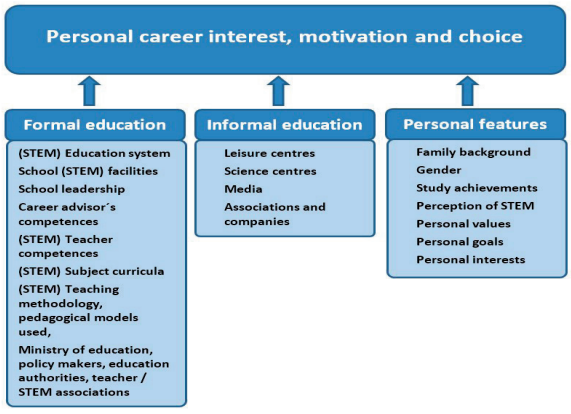


Fig. 2 Key factors determining personal career interest, motivation and choice

The research results show that the young generation has surprisingly quite a positive attitude towards science and technology, bearing in mind their contribution to making the life of the youth better and easier ([4] and [5]). But, on the other hand, they find the image of science and technology professions to a great extent negative. This is connected with the image of science and technology in the society and the values preferred by the society. Significant changes in young people's values were identified in Eurobarometer 2006 [6], but none of them is in favour of STEM. Some of the young people reject materialism,

give priority to personal development and private life over work and they are reluctant to accept heavy workloads, such as those connected with STEM studies and careers. Others prioritise career and money, but prefer business studies, economics, law or medical studies; they do not perceive science and technology rewarding enough. Moreover, the interests of the youth differ more and more from those of the society needs (compare, for example, with [7], [8] or [9]).

In order to be interested in technology or engineering professions and choose them for their future careers, students have to be positive about technology and activities connected with technology, having a well "developed technology thinking". The beginning of formation of these personal features and the deepening of one's interest in science and technology professions (based on the acquired personal features) should therefore happen much earlier than at higher levels of education (ISCED 3, ISCED 4). Then it is too late. Technology education should already be introduced in primary and lower secondary education. But, as Phang et al. point out [10], one of the most significant reasons for the falling student enrolment in STEM study programmes is that they are turned off by the way these subjects are taught at schools. Students find studying science too difficult, boring, not worth the effort and not attractive enough for their everyday lives. Moreover, there is an evidence that many curricula are "over-stuffed" with factual content and too many added topics while only a few of them have been removed [11], which also leads students to having the impression that STEM is about a factual recall, rather than understanding STEM's role in society, i.e. how STEM subjects are used in solving practical needs in different areas of industry and society. Students' motivation and interest in dealing with STEM remains relatively low because they struggle to link school STEM experiences to their lives, though they often are very skilled users of STEM products, especially mobile phones and computers.

4. School policy and its impact on STEM teaching

The above-mentioned findings point out the necessity to improve STEM education from the lower levels of schooling. In this aspect we are facing a very paradoxical situation which is true not only for Slovakia. As the official reports show [12], in most of the OECD countries the governments place enhancement of STEM education among the priorities of their national education policies. But this is not always backed up with the appropriate systematic support and corresponding investments, mainly at lower levels of education.

Reform steps carried out in many European countries within the context of the EU recommendations and the building of the knowledge society should contribute to the reinforcement and improvement of the technology education status in two aspects – in relation to the status of the relevant school subjects within the curriculum as well as in relation to students' attitude to technology and science subjects. Unfortunately, it is not a rare case that the changes introduced within the reforms do not function in this way: they either do not fulfil the expectations or do not bring the intended improvement of the previous situation. In Slovakia, this was the case of the curricular reform introduced in 2008.

Before the reform, technology issues in the Slovak lower secondary schools were taught within the framework of the subject called *technical education.* The subject used to have a time allocation of 1 lesson per week in each grade (grades 6^{th} – 9^{th}). The reform changed the name of the subject to *technology* and cut its time allocation to a half of a lesson per week taught only in the 7^{th} and 8^{th} grades. At the same time, the schools were given a possibility to use so-called elective lessons to enhance the education in some areas; however, this additional allocation of extra time out of the elective lessons was based on the school managers' decision. This means that schools could support technical education either by including additional lessons for teaching *technology* or by incorporating some additional elective subjects related to *technology* (STEM) teaching. The content of the compulsory subjects was determined up to 70 % by the State Education Programme ([13], [14] and 15]) and the remaining 30 % was designed by schools in their School Education Programme. In this respect the 2008 reform in relation to technology education could be assessed both as negative and positive. But the issue is what really happened in practice, whether the elective lessons were used to support technology education or not.

During the period of the years 2013–2015 (following the implementation of the curricular reform in all grades of the lower secondary education which was finished in 2012) the research aimed at analysing the curricular reform impact on technology education at schools was carried out ([16] and [17]). The researchers found out that despite the general strengths of the curricular reform, its impact on technical education at schools was significantly negative. The curricular reform reduced the compulsory number of lessons allocated to teaching *technology* and the possibility to increase the compulsory number of lessons by adding some of the elective lessons to teaching *technology* was used only in 22 % of schools. In addition to that, 12 % of schools introduced extracurricular activities focusing on technology for their students. But even the sum of these two figures cannot be assessed as a positive impact of the reform on technology education.

Another striking fact is that within the introduction of the curricular reform no official statement was issued which would show a state strategy regarding the role of technology education at schools and no measures were introduced to support the establishment of material and technical conditions adequate for *technology* teaching. This was done only in May 2012 in the frame of the Manifesto of the Government of the Slovak Republic [18], in which the government introduced draft measures to enhance vocational training and education. In the Manifesto the government stated also the need to reinforce teaching maths,

science and technical subjects. Following the Manifesto and the constantly growing criticism of vocational training and education expressed by employers, the Ministry of Education, Science, Research and Sport of the Slovak Republic initiated a national project financed by the EU *Support for professional orientation of pupils of primary and lower secondary school to vocational education and training through the development of polytechnic education aimed at developing work skills and work with talents* (so-called *Workrooms project* [19]). Though its implementation started only in April 2013, i.e. 6 years after the beginning of the curricular reform implementation, it was perceived as a support means to the reform and it received a very positive feedback.

The project objective was to help solving the alarming situation in students' choice of secondary school depending on the profession they have chosen. As a result of the state education policy during the last two decades (or rather as a result of the absence of any long-term concept of this policy) we are currently facing evident lack of students' interest in studying at secondary vocational schools. Consequently, this situation still leads to the increasing lack of qualified work forces on the labour market [20], as majority of pupils prefer to study at comprehensive grammar schools though those schools do not prepare them for any expert performance in any particular profession.

5. Lack of teachers with STEM major qualification

In the context of the continually decreasing youth's interest in STEM education, the OECD calls attention to the issues of the qualification of teachers teaching science and technology subjects. These teachers are often qualified in other major subjects but due to the lack of teachers with relevant qualification in teaching natural science subjects they are obliged to teach subjects for which they do not have adequate competencies [12].

An integral part of the above-mentioned analysis of the curricular reform impact on technology education in Slovak schools in 2013–2015 was also the issue of qualified teaching of the subject *technology*, i.e. finding what percentage of teachers teaching the subject in lower secondary schools is qualified to teach it [16]. In order to map the extent to which teaching technology education (school subject *technology*) is ensured by qualified teachers and to find what the length of their teaching at schools is, the research data from both head-teachers and teachers were collected. The findings are presented in a graphic form in Fig. 3.

The graphical data presented in Fig. 3 show an alarming finding that almost 50 % of teachers qualified to teach *technology* belong to the category of teachers with more than 25 years of teaching practice. These teachers entered their pedagogical career before the year 1989. The data also implicitly show the radical decrease of students' interest in studying *technology* as one of the major subjects in teacher training programmes; and as seen in Fig. 3 (from right to left), the trend still increases. The cut down of the compulsory lessons allocated to *technology* in the introduced curricular reform has by no means contributed to the improved status either of the subject or of the technical education in general.

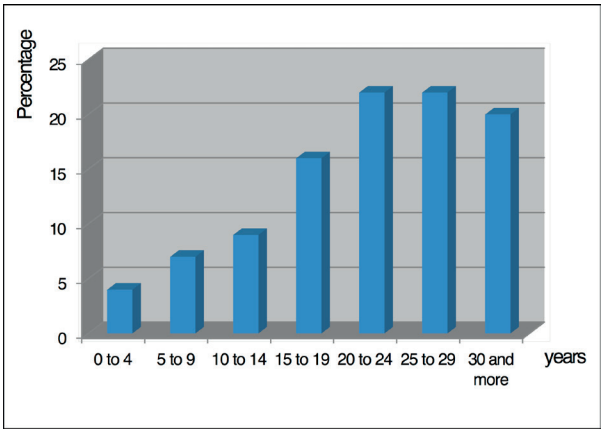


Fig. 3 Qualified technology education teachers at schools and the length of their teaching practice (Source [16])

As it follows from the analysis of the length of teaching practice of *technology* teachers currently employed at schools, their number will be decreasing in the next years as a consequence of their retirement. This means that the already alarming ratio (58 % : 42 %) will very quickly change "in favour" of the unqualified teachers as there is no platform in the society which would enable a smooth substitution of the leaving teachers; the interest in *technology* teacher training programmes is minimal. Even if some systematic steps were immediately taken to increase the interest in this study, their first results would be visible only in five years after their introduction (i.e. in the time needed for the standard length of teacher training study programmes).

Another alarming finding is the fact that in one third of the schools (34 %) no qualified *technology* teacher is among the school staff. In the other schools (59 %) there are mostly one or two qualified teachers among the staff (42 % and 17 % respectively). Three and more *technology* teachers in a school are a very rare case (5 %).

The analysis of the number of qualified *technology* teachers in schools in relation to their size showed that the worst situation is in small schools. At least one qualified *technology* teacher can be found in 52 - 56 % of small schools (with the number of students up to 200), in three quarters (75 %) of middle sized schools (with the number of students from 201 to 400) and in 84 % of big schools (with more than 400 students).

Taking into consideration a small number of lessons allocated to the subject *technology education* in the past and their cut down for teaching *technology* as introduced in the current curricular

reform (compulsory lessons allocated by the State Educational Programme), even big schools do not need more qualified *technology* teachers. The situation in the past and the curricular change have caused particularly low demand for *technology* teachers on the labour market which, together with the highly demanding study programme in *technology* teacher training, may have been the factors significantly contributing to a low and constantly decreasing interest in *technology* teacher training study programmes in the past 20 years (see the data on numbers of qualified *technology* teachers with the length of teaching practice under 20 years in Fig. 3).

Although the reform has introduced a possibility to increase the number of lessons for technology education through the use of the elective lessons, it would be, in principle, irresponsible from the head teachers to take the decision on increasing the number of lessons allocated to *technology* teaching without having enough qualified teachers to teach it. Thus, the lack of qualified *technology* teachers together with the absence of classrooms (workrooms) with special equipment for *technology* teaching and the low status of the subject have caused, as mentioned above, that only 22 % of schools have used this possibility.

6. Regional differences in the approach to teaching *technology*

Further analyses were done with the focus on differences in teaching *technology* in different regions of Slovakia.

As to the numbers of qualified *technology* teachers, the worst situation was indicated in Bratislava, Trencin and Nitra regions (the highest percentage of schools without any qualified *technology* teacher). For most of the regions of Slovakia an "average state" is typical. This means one qualified *technology* teacher per school in average (Banska Bystrica, Trnava, Zilina, Kosice and Presov regions). Schools with more than one qualified *technology* teacher are very rare and they are located mostly in Kosice and Presov regions.

To analyse the regional differences in the approach to teaching *technology,* semi-structured interviews with research sample of *technology* teachers from Bratislava and Presov region were carried out [21].

The research was aimed at finding out the opinions and experiences of teachers regarding teaching *technology.* The key question of the carried out interviews was examining the respondents' opinions about pros and cons of teaching *technology*. The comparison of the findings from the qualitative analysis of the recorded interviews with respondents from Bratislava and Presov regions indeed proved differences in their approach to teaching the subject. The core difference was well-turned in a statement of one of the respondents: "I taught also far away from Bratislava. The support given to *technology* teaching was much bigger there." Based on the data from the semi-structured interviews with *technology* teachers, the open criticism and refusal of this school subject is typical for Western Slovakia (Bratislava region). In Eastern Slovakia (represented by Presov region), higher acceptance of the subject is evident. Even though the teachers' attitude to the subject is quite critical there, too, they are aware of the lack of teaching materials and material equipment necessary for *technology* teaching, they are trying to find their own way to teach *technology* in particular conditions of their schools. While in Bratislava region there is a tendency to give preference to foreign language teaching and to put *technology* aside (or even some disinterest, apathy and resignation), in Presov region an ambition and effort of teachers to activate students and ensure for them various materials is evident. A rather frequent opinion in Presov region is that *technology* should be taught with an increased time allocation. On the contrary, school management in Bratislava region in most cases perceives *technology* as a supplementary subject which had its justification in the past (because of the handicrafts and technical skills) but nowadays it has lost its justification. An example of such opinion can be the following statement: "Why should we produce anything? We, in Bratislava can buy anything at a Chinese shop. Let technology ad handy-crafts be taught elsewhere, for us, in the capital city, it has no sense. *Technology* should be just an optional subject." But at the same time the teachers point out the fact that children and young people are unable even to hit a nail with a hammer; they are mastering mobiles and computers but losing common manual skills.

The approach of students' parents to teaching *technology* is also significantly different in the referred regions. This is reflected in their co-operation with schools when it comes to teaching this subject. They do not support schools' effort to ensure relevant conditions for teaching *technology.* It is not a rare case that they even refuse to provide any necessary materials their children need for *technology* lessons. In the cases of cleaning the school premises a criticism occurs why their child should work manually, after all s/he is assigned to become a lawyer or a doctor.

7. Conclusion

The above-presented and discussed research results show, in an indirect way, how the new living conditions influence the values accepted by the young generation, revealing at the same time also their interests and professional orientation. Paradoxically, the state school policy declares the support of the government for technology education but in practice we are confronted with negative approaches to the professional careers related to technology and manual or technological skills.

References

[1] OECD: *Encouraging Student Interest in Science and Technology Studies*. Paris : OECD, 2008. ISBN 978-92-64-04069-4.

[2] JOYCE, A., DZOGA, M.: *Science, Technology, Engineering and Mathematics Education: Overcoming Challenges in Europe*. European Schoolnet : 2011. ISBN 9789491440144.

[3] HASKOVA, A., ZAHOREC, J.: *Analysis of Interest in Natural Science Subjects - as a Precondition of Development of University Education in Technical Branches.* Perspective in Education Process at Universities with Technical Orientation in Visegrad Countries. Nitra : SPU, 2008, 34-39. ISBN 978-80-552-0148-1.

[4] LUKACOVA, D.: *Attitudes of Lower Secondary School Students to Technology Education* (in Slovak). Technické vzdelavanie ako sucast vseobecneho vzdelavania, Banska Bystrica : UMB, 2009. ISBN 978-80-8083-878-2.

[5] ZAHOREC, J., HASKOVA, A., MUNK, M., BILEK, M.: Tertiary Economy and Managerial Study Fields and Issues of Science Education Aimed at Database Systems. *J. of Baltic Science Education*, vol. 14, No. 4, 2015, 535-555. ISSN 1648-3898.

[6] EC: *Eurobarometer 2006: Public Opinion in European Union*. EC, 2007. Available at: http://ec.europa.eu/public_opinion/archives/eb/eb66/eb66_en.pdf.

[7] VALCOVA, K., PAVLIKOVA, M., ROUBALOVA, M.: Religious Existentialism as a Countermeasure to Moralistic Therapeutic Deism. *Communications - Scientific Letters of the University of Zilina*, vol. 16, No. 3, 2016, 98-104. ISSN 1335-4205.

[8] KONDRLA, M., PAVLIKOVA, M.: From Formal Ethics to Existential Ethics. *European J. of Science and Theology,* vol. 12, No. 3, 2016, 101-111. ISSN 1841-0464.

[9] VALCO, M., KRALIK, R., BARETT, L.: Morals Implications of Augustine´s Philosophical and Spiritual Journey in his Confessiones. *Communications - Scientific Letters of the University of Zilina*, vol. 17, No. 2, 2015, 103-108. ISSN 1335-4205.

[10] PHANG, F. A., ABU, M. S., ALI, M. B., SALLEH S.: *Faktor Penyumbang Kepada Kemerosotan Penyertaan Pelajar Dalam Aliran Sains: Satu Analisis Sorotan Tesis,* Contributing factors to the decline in student participation in Science Stream: A Thesis Highlights Analysis, Skudai : Universiti Teknologi Malaysia, 2012.

[11] SIEW, N. M., AMIR, N., CHONG, CH. L.: The Perceptions of Pre-Service and In-Service Teachers Regarding a Project-Based STEM Approach to Teaching Science. *SpringerPlus,* vol. 4, No. 8, 2015. doi: 10.1186/2193-1801-4-8. Available at: http://www.springerplus.com/content/4/1/8

[12] OECD: *Evolution of Student Interest in Science and Technology Studies: Policy Report*. OECD, 2006. Available at: http://www.oecd.org/science/sci-tech/36645825.pdf.

[13] Law No 245/2008 on Education. Available at: https://www.minedu.sk/data/att/10246.pdf.

[14] SVP ISCED 1: *State Educational Program for the First Stage of Basic Education (ISCED 1), Educational Area: A Man and the World of the Work* (in Slovak). Available at: http://www.statpedu.sk/sites/default/files/dokumenty/statny-vzdelavaci-program/isced1_spu_uprava.pdf

[15] SVP ISCED 2: *State Educational Program for the Second Stage of Basic Education - Lower Secondary Education (ISCED 2), Educational Area: A Man and the World of the Work* (in Slovak). Available at: http://www.statpedu.sk/sites/default/files/dokumenty/statny-vzdelavaci-program/isced2_spu_uprava.pdf

[16] HASKOVA, A., BANESZ, G.: *Technology at Lower Secondary Schools - Yes or Not* (in Slovak). Praha : Verbum, 2015. ISBN 978-80-87800-31-7.

[17] BANESZ, G.: Assessment of the Key Attributes of the Curricular Reform from the Teachers' Point of View (in Slovak). *Technika a vzdelavanie /* Technology and education*,* vol. 4, No. 2, 2015, 8-11, ISSN 1339-9888.

[18] *Manifesto of the Government of the Slovak Republic*. Available at: http://www.vlada.gov.sk/programove-vyhlasenie-vlady-sr-na-roky-2012-2016/.

[19] SIOV: *National Project Supporting Professional Orientation of Primary School Pupils to Vocational Education and Preparation through Development of Polytechnic Education Focused on Development of Working Skills and Work with Talent* (in Slovak). Available at: http://www.zsodborne.sk/index.php/o-projekte/o-projekte.

[20] LUKACOVA, D.: Company Requirements on Graduates (in Slovak). *Trends in Education*, vol. 7, No. 1, 2014, 345-348. ISSN 1805-8949.

[21] MANDULAKOVA, S.: Regional Differences in Education of Technology (in Slovak). *Vzajomna informovanost - cesta k efektivnemu rozvoju vedecko-pedagogickej cinnosti /* Informing each other - a way to effective development of science and teaching activities, Nitra : PF UKF, 2016, 32-39. ISBN 978-80-558-1094-2.

Helena Grecmanova - Miroslav Dopita - Eva Urbanovska*

ETHICAL ASPECTS OF COMMUNICATION IN THE ACADEMIC ENVIRONMENT

The changes in the academic environment are related to the changes in the organisational culture and subsequently also in communication at universities. Transformation of universities from temples of knowledge into organisations producing qualified workforce and research findings applicable in practice is very important in this process. Changes in the relations and communication among academic staff as well as between the management of universities and their employees are connected with this process too. The presented paper focuses on these relations and communication among academics and between academics and the management of universities in detail. The method of secondary analysis of data collected by means of an organizational climate questionnaire at a teacher training faculty was applied in the article. The analysis of the mentioned data illustrates perception of the management's communication by the academic staff.

Keywords: *Ethic, communication, university, academics, organisational climate, management.*

1. Introduction

Ethical issues of professional communication and communication in an organisation have recently been the subject of many studies [1-4]. The revived interest is related to changes of professions and organisations where communication is carried on. What has been changing in recent times is organisations' visions and missions, their organisational structure as well as requirements for employees. This is why it is necessary to pay more attention to communication that has been changing due to information technologies too. Communication among organisations' managements, middle management and employees is more and more frequently not carried out face-to-face but using technical communication means.[1] The impact of these changes can be observed also on the level of universities as organisations affected by organisational and technological changes. Universities stop being temples of knowledge but are approached as producers of knowledge and qualified workforce. The change of the substance of universities causes an increase of interest in research of communication climate too [5-8].

It is typical of universities to describe their organisation as collegial [9, p. 15; 10, pp. 4-5], based on participative decision making. Actions are based on consensus and discussion. Power is represented by experts and professionals. The structure of the collegial organisational frame is circular. Metaphorically, it can be described as a circle. The legal process, the faculty senate and professional associations are typical examples of this organisational framework. Leadership corresponds with the rule "first among equals". Communication is protracted and oral based. The scope of influence is faculty. The reward structure is based on expertise in discipline and peer review. Academic disciplines are the source of structure. Co-workers perceive workers as colleagues.

Communication with co-workers as colleagues emphasises establishment and observance of communication rules that are reflected directly in the ethics of communication. *"Communication ethics are central to the dialogic process of negotiating contending social goods in a postmodern society, an era of narrative and virtue contention"* [1, pp. 143-144]. Janie M. H. Fritz [3, p. 57] states that *"Communication in the workplace is an ethical matter because it has consequences for the task and relationship areas of organizational life. Principles of communication ethics in the workplace are applicable at the individual, dyadic and team level. Applying communication ethics in the workplace setting requires thoughtful discernment of the consequences of communication for the organization and the people who work in it."*

[1] In this context, a warning by Norbert Wiener [11, pp. 79-80] has already been mentioned in relation to phonetic and semantic changes of speech and thus its comprehensibility.

* [1,2]Helena Grecmanova, [2]Miroslav Dopita, [1,3]Eva Urbanovska
[1]Faculty of Humanities, University of Zilina, Slovakia
[2]Faculty of Arts, Palacky University Olomouc, Czech Republic
[3]Faculty of Public Policy, Silesian University in Opava, Czech Republic
E-mail: helena.grecmanova@fhv.uniza.sk

Charles W. Redding [12], classic of studies of communication in organisation, specified five factors in relation to communication climate as one of the variants of organisational climate; these are: supportiveness; participative decision making, trust, confidence, credibility; openness and candour; and high performance goals. Marshall Poole [13, p. 107] added some reflections about ideal communication climate containing five dimensions: "*collective beliefs, expectations, and values regarding communication, and is generated in interaction around organizational practices via a continuous process of structuration*". Communication climate is created by continuous evaluation of interactions with other members of the organisation. Still, statistical analyses of communication climate researches have shown also other dimensions. Pamela Shockley-Zalabak [14, pp. 356-358] describes dimensions of structure, decision making, motivation, creativity and teamwork.

A process of creating positive communication climate was suggested in an already classical study by Jack Gibb [15]. He defined characteristics of communication leading to supportive communication climate on the one hand, and characteristics triggering off defensive mechanisms in an individual on the other hand. These make communication harder or even impossible, creating defensive communication climate. He defines defensive behaviour as behaviour that is carried out when an individual perceives or presumes a threat of attack in the group. A person acting defensively dedicates a great deal of energy to their self-defence, is not able to perceive precisely motives, values and emotions in their communication partners (message transmitters). Their own anxieties, motives and worries are mixed in the content of the received message. The person takes a defensive position, and thus arouses these tendencies in other persons too, and the subsequent circle response becomes destructive. Efficiency of communication decreases. This is confirmed also by Richard Bessoth [16] who accentuates trust between an organisation's management and employees; if trust is lacking between them a great deal of energy and time is dedicated to measures for their own defence. Information is not passed on, nobody takes risk.

What can be used for research on communication on the level of universities is, among other approaches, research of organisational climate using a questionnaire. Our study is based on a secondary analysis of research data the objective of which was designing a research tool (questionnaire) for measuring organisational climate of academic workplaces [17]. The opportunity to evaluate the field of communication at particular faculties turned out to be an added value.

2. Objectives and hypotheses

The objective of the secondary data analysis is to analyse selected aspects of communication of department managements and faculty managements. Two hypotheses were formulated in relation to studied communication of department and faculty managements:

H1: Evaluation of sufficient feedback from department managements is significantly related to evaluation of quality of criticism reasoning from department managements.

H2: Evaluation of communication between faculty managements and employees and workplaces is significantly related to the studied partial indicators of good communication from faculty managements.

3. Method

The designed organisational climate questionnaire was tested in a pilot study, and it contained 70 items at the stage of partial study on which we based our paper. The questionnaire design followed the structure of items describing behaviour of academic staff as well as behaviour of department managements and, last but not least, behaviour of faculty managements. Each of the mentioned areas contained questions explicitly focused on communication of a result of communication. Ten items evaluating communication of department managements (3 items) and faculty managements (7 items) were chosen for secondary analysis. Respondents were academic staff answering the questions by means of a 5-point scale: I definitely agree (1), I rather agree (2), I cannot say (3), I rather disagree (4), and I definitely disagree (5). Questionnaire returnability was 60% (117 questionnaires). Cronbach's alpha coefficient was 0.94 in this version of the questionnaire as a whole [17, p. 77].

4. Results

The data analysis is based on medians and quartiles. The mentioned statistical parameters are presented graphically. Lower scale values mean more positive climate in the particular dimension. The scale is inverted and marked with letter R in negatively formulated items, as shown in tables and figures of department and faculty managements' behaviour. Correlations in all the below mentioned questionnaire items focused on communication are indicated by means of Spearman's correlation coefficient for ordinary data on significance level 0.01.

Communication analysis in the field of behaviour of department managements showed statistical significance in all the three correlated items (Table 1). Medium statistical dependence was indicated between the item of sufficient feedback from department managements to staff (item 38) and good reasoning of criticism of academics' work from the corresponding workplace (item 39). In other words: the more comprehensible reasoning of criticism from the particular workplace, the more positive evaluation of sufficient feedback on the quality of their work from the staff (and vice versa).

Spearman's correlations of communication in the field of the department managements' behaviour.
The marked correlations are significant on the level p < .01000. Table 1

Items (item numbers and wordings)	Department managements' behaviour (item numbers)		
	34	38	39
34 Tasks assigned by the workplace management (department, institute management) are comprehensible for the academic staff.	x	0.343586	0.372391
38 The academic staff receive sufficient feedback on the quality of their work from the workplace management (department, institute management).		X	0.568470
39 If the workplace management (department, institute management) criticises the academic staff work, the opinions are well reasoned.			x

A negative result was found in the item focused on feedback of the quality of staff' work in interpretation of items studying communication with department management (item 38), as proved by Fig. 1.

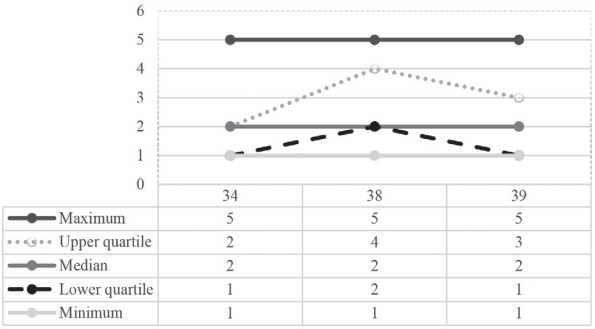


Fig. 1 Department managements' behaviour (n=117)

Based on the above findings, it is possible to accept hypothesis H1.

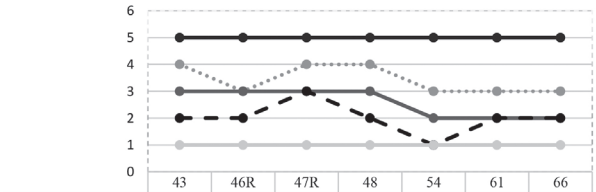
Statistically significant correlations were found in nearly all the observed characteristics of faculty managements' communication (Table 2). Besides others, a correlation was indicated in evaluation of efficiency of communication between faculty managements and particular workplaces and all the other studied items. This also confirms validity of the formulated hypothesis H2. The only item where correlation was not identified is possibility to express one's opinion about the faculty's important decisions (item 48) in relation to early announcement of faculty affairs (item 54). Contrary to the other confirmed correlations, it shows low dependence in relation to other items. Another exception is the correlation of the item focused on prevailing faculty managements' decision-making "behind closed doors" (item 47) with early announcement of faculty affairs (item 54) that was proved significant on level p < .05.

When analysing ways of communication by faculty managements, the respondents state that criteria of evaluation of academic staff work are frequently not clearly formulated (item 43), that evaluators do frequently not have an opportunity to comment on important decisions of faculty managements (item 48), and that faculty managements frequently make decisions

Spearman's correlations of communication in the field of the faculty management's behaviour.
The marked correlations are significant on the level p < .01000. The correlation in italics is significant on the level p < .05. Table 2

Items (item numbers and wordings)	Faculty management's behaviour (item numbers)						
	43	46	47	48	54	61	66
43 Criteria of evaluation of the academic staff's work are clearly articulated.	x	-0.478699	-0.534886	0.358757	0.257812	0.525386	0.527163
46 The faculty management does not admit its failures.		x	0.633791	-0.454158	-0.305480	-0.533605	-0.626062
47 The faculty management makes decisions mostly "behind closed doors".			x	-0.530142	*-0.193635*	-0.442610	-0.559634
48 I can comment on important decisions of the faculty management.				X	0.171734	0.285545	0.447819
54 Faculty events are announced in time.					x	0.357113	0.321258
61 Communication between the faculty management and my workplace (department, institute) is efficient.						X	0.571879
66 The faculty management reasons conceptual changes properly.							X

"behind closed doors" (item 47R); values of median and quartiles based on the reverted scale of negatively formulated items correspond with this (Fig. 2).



	43	46R	47R	48	54	61	66
Maximum	5	5	5	5	5	5	5
Upper quartile	4	3	4	4	3	3	3
Median	3	3	3	3	2	2	2
Lower quartile	2	2	3	2	1	2	2
Minimum	1	1	1	1	1	1	1

Fig. 2 Faculty management's behaviour (n=117)

5. Discussion

The analysed values and correlations of department managements' communication indicate relative satisfaction with communication, except for evaluation of the item focused on receiving feedback about the quality of academic staff work. The confirmed correlation between providing feedback and reasoning criticism can be an evidence of interconnection of these two communication competencies on the one hand. It means that if a workplace's head does not provide sufficient feedback then she/he does not reason their criticism. The identified link could also be explained by the fact that the greater problems a superior has with reasoning criticism, the less willing she/he is to provide feedback about the quality of their subordinates' work, and vice versa. Still, this statement is rather hypothetical, it is necessary to verify its validity. On the other hand, it is necessary to consider the evaluator's personality and the human tendency to maintain consistency of one's attitudes as the cause of this phenomenon. In this context, the more negatively an evaluator evaluates the quality of reasoning of criticism from their superiors, the more negatively she/he can evaluate provision of feedback. In any case, both the competencies rank among the fundamental assertive skills and should be developed sufficiently in all managers. It can be said that our finding corresponds with the knowledge published in literature [see e.g. 18] on the importance of providing feedback and constructive criticism while accepting all ethical principles. Jiri Mares and Jaro Krivohlavy [19, p. 96] deal with feedback and, as we can say, criticism as a cognitive correcting and regulating information on a person interested in a process in which they participate and care about. Further, the importance of feedback for employees is on the developmental and social levels; thus, its lack in an organisation is significant. According to Joseph Basile [20, p. 45], an employee who is seriously informed of their performance and whom his/her superior really consults is self-conscious and tries to be effective. If she/he is allowed to think, express herself/himself, accept responsibility, she/he grows.

Frequency of the confirmed correlations in the area of communication between academic staff and faculty managements indicates interconnection of particular communication skills. If there are weaknesses or, on the contrary, strengths identified in one dimension, they usually show in other dimensions too. The results also indicate dependence of more global evaluation of communication efficiency on partial indicators. It means that if an individual evaluates the faculty management's communication with her/his own workplace as efficient or inefficient it is supported by not one but several characteristics of behaviour or several manifested competencies.

The secondary analysis of the items focused on evaluation of faculty managements' communication indicates necessity of paying more attention to faculty managements' communication with academic staff. It can be stated at the cost of slight simplification that friendliness in communication is disappearing on the higher levels of the management hierarchy at the studied faculty. What can also be considered is superiority complex characterised by Alfred Adler [21, p. 63] as clearly showing in attitudes, in exaggerated opinion about oneself, one's talent and abilities, in exaggerated requirements for oneself and others. The overall view of the results of the performed data analysis is in correspondence with the described theoretical starting points and the mentioned factor models supporting positive communication climate and healthy communication.

6. Conclusion

We succeeded in analysing significant characteristics of academic communication based on the secondary analysis of data from an organisational climate research. With regard to the study objective, evaluation of department and faculty managements' communication with academic staff was chosen where the communication processes between academic staff and faculty managements are experienced in a more negative way in comparison with evaluation of communication on the level of department managements.

In relation to the found facts, it is necessary to approach the academic environment as an organisation where rules of communication and communications ethics apply. *"Practicing communications ethics contributes to climate of integrity in the workplace, fostering and ensuring both personal and institutional flourishing"* [3, p. 44]. The starting point is showing mutual respect and common decency. Interpersonal communication can help society experiencing the crisis of values [22, p. 129], and only a cultivated person can keep control over a situation. According to Ladislav Lencz [23], ethical behaviour in a human is shown in respect for oneself as well as the others, ability of empathy, ability of considering needs and interests of both an individual and society by exceeding the limits of one's own "I".

Acknowledgements

Some results presented in this article were supported by the Czech Science Foundation (project no. P407/11/0696 Perception of Organizational Climate of Faculties of Education by Academic Staff) and the Faculty of Arts, Palacký University Olomouc (IGA FF 2015 035 Integrated Social Science Research).

References

[1] ARNETT, R. C., ARNESON, P., BELL, L. M.: Communication Ethic: The Dialogic Turn. In ARNESON, P. (ed.): *Exploring Communication Ethics: Interviews with Influential Scholars in the Field.* New York: Peter Lang, 2007, pp. 143-184. ISBN 978-0-8204-8824-0.

[2] BLYLER, N. R., THRALLS, C. (eds.).: *Professional Communication: The Social Perspective.* London: Sage, 1993, 296 pp. ISBN 978-0-8039-3935-3.

[3] FRITZ, J. M. H.: Ethics Matters: Why Ethical Communication Makes a Difference in Today's Workplace. In WRENCH, J. S. (ed.): *Workplace Communication for the 21st Century: Internal Workplace Communication.* Santa Barbara: Praeger, 2013, pp. 39-60. EISBN 978-0-313-39632-8.

[4] WRENCH, J. S. (ed.): *Workplace Communication for the 21st Century: Internal Workplace Communication.* Santa Barbara: Praeger, 2013, 772 pp. EISBN 978-0-313-39632-8.

[5] PETERSON, M. W.: The Study of Colleges and Universities as Organization. In GUMPORT, P. J. (ed.): *Sociology of Higher Education. Contributions and Their Context.* Baltimore: The Johns Hopkins University Press, 2007, pp. 147-184. ISBN 978-0-8018-8615-7.

[6] LOUIS, K. S., HOLDSWORTH, J. M., ANDERSON, M. S., CAMPBELL, E. G.: Becoming a Scientist: The Effects of Work-Group Size and Organizational Climate. *The J. of Higher Education,* 2007, 78, 3, pp. 311-336. ISSN 0022-1546.

[7] MCMURRAY, A., SCOTT, D.: Determinants of Organisational Climate for Academia, *Higher Education Research and Development.* 2013, 32, 6, pp. 960-974. ISSN 0729-4360.

[8] MUSAH, M. B., ALI, H. M., VAZHATHODI AL-HUDAWI, S. H., TAHIR, L. M., DAUD, K. B., SAID, H. B., KAMIL, N. M.: Organisational Climate as a Predictor of Workforce Performance in the Malaysian Higher Education Institutions. *Quality Assurance in Education: An International Perspective*, 2016, 24, 3, 416-438. ISSN 0968-4883. doi:10.1108/QAE-10-2014-0048

[9] CHAFFEE, E. E.: *Rational Decision Making in Higher Education*. Boulder: National Center for Higher Education Management Systems, 1983, 92 pp.

[10] MANNING, K.: *Organizational Theory in Higher Education.* New York: Routledge, 2013, 232 pp. ISBN 978-0-415-87467-0.

[11] WEINER, N.: *The Human Use of Human Beings. Cybernetics and Society.* London: Free Association Books, 1989 [1950], 208 pp. ISBN 1-85343-075-7.

[12] REDDING, W. C.: *Communication within the Organization.* New York: Industrial Communication Council, 1972.

[13] POOLE, M.: Communication and Organizational Climates. Review, Critique, and a New Perspective. In MCPHEE, R. D., TOMPKINS, P. K. (eds.): *Organizational Communication: Traditional Themes and New Directions.* Beverly Hills: Sage, 1985, pp. 79-108. ISBN 978-0-8039-2187-0.

[14] SHOCKLEY-ZALABAK, P.: *Fundamentals of Organizational Communication. Knowledge, Sensitivity, Skills, Values.* New York: Longman, 1988. ISBN 0-582-28635-2.

[15] GIBB, J. R.: Defensive Communication. *J. of Communication,* 1961, 11, 3, pp. 141-148. ISSN 1460-2466.

[16] BESSOTH, R.: K.L.I.M.A.: Five Strategies of Leadership that Bring Everyone on Board. Development of New Management Concepts (in German). *Pädagogische Führung,* 2003, 14, 3, pp. 122-128. ISSN 0939-0413.

[17] GRECMANOVA, H., DOPITA, M. et al.: *Organizational Climate of Teacher Training Faculties* (in Czech). Olomouc: Univerzita Palackého v Olomouci, 2013, 166 pp. ISBN 978-80-244-3863-4.

[18] VYBIRAL, Z.: *Psychology of Communication* (in Czech). Praha: Portal, 2009, 319 pp. ISBN 978-80-7367-387-1.

[19] MARES, J., KRIVOHLAVY, J.: *Communication in School* (in Czech). Brno: Masarykova univerzita, 1995, 210 pp. ISBN 80-210-1070-3.

[20] BASILE, J.: *Cultural Development of Managers, Executives, and Professionals* (in Czech). Praha: Svoboda, 1970, 104 pp.

[21] ADLER, A.: *The Meaning of Life* (in Slovak). Bratislava: IRIS, 1998, 169 pp. ISBN 80-88778-05-0.

[22] ROCHE OLIVAR, R.: *Psychology and Education for Pro-Sociality: Optimization of Attitudes and Behaviours of Generosity, Help, Cooperation and Solidarity: A Program Appropriate to School and Family Contexts* (in Spanish). Barcelona: Universitat Autonoma de Barcelona, 2002, 291 pp. ISBN 84-490-0327-X.

[23] LENCZ, L.: The Slovak Ethical Education Project. *Cambridge Journal of Education,* 1994, 24, 3, pp. 443–451. ISSN 0305-764X.

Marek Debnar*

THE SEMANTIC FIELDS OF SELECTED ETHICAL TERMS IN THE WRITTEN AND WEB SUBCORPUS OF THE SLOVAK NATIONAL CORPUS

The paper investigates the issue of semantic field of selected ethical terminology (e.g. morality, conscience, moral action, etc.) in the Slovak National Corpus (SNC). The examination covers two different subcorpuses (written and web) containing a collection of about thousand text units. The basic framework of written subcorpus consists of scientific articles from the field of humanities, religion and art. The web subcorpus was generated from website www.salon.eu.sk offering essays and feuilletons published by the European and world press, with special focus on Central European countries. Firstly, the paper describes the way of designing and building these subcorpuses based on critical interpretation of text metadata, and, secondly, it focuses on the rate of occurrence for the subject areas − Domains and Subdomains − that refer to ethical terminology included in the SNC. The paper then outlines the ways of interpreting the statistical results of the quantitative occurrence of the selected word forms, and it also defines the ways of using the subcorpus not only for linguistic and literary purposes, but also in interdisciplinary research areas.

Keywords: *Ethics, Slovak National Corpus, Style and Genre annotation, Semantic fields.*

1. Introduction

Methods used in the humanities are undergoing a period of transformation caused by the application of digital technologies in all areas of scientific research. The aim of this paper is to present the procedure used when constructing a genre subcorpus and to represent the results of this study – an approximation of the semantic fields of texts from the essay genre. Another goal is to present the results of related empirical research and to inform experts about certain online tools that are available and ready for further use – the corpus of religious texts and the corpus of essayistic texts.

2. The Usage of Corpora in Interdisciplinary Research

Extensive text corpora (such as prim-7.0-public-all [1]) are compiled using various types and genres in order to make them representative, i.e. they should present the linguistic system in a form that is actually used in practice. Each of the three main types currently distinguished in prim-7.0-public-all (literary texts, journalistic texts, professional texts) encompasses further subtypes and genres. In addition to standard journalistic texts (primarily articles from newspapers and magazines), the category of journalistic texts in the SNC (Slovak National Corpus) database also includes administrative texts and texts from certain websites and blogs. Professional literature includes scientific monographs, textbooks, course literature, articles from popular-science magazines and specialized magazines as well as encyclopaedia entries. In addition to poems, short stories and novels, literary texts can also include other works – for instance a book of essays or interviews with significant figures from cultural and social life.

The extent of the prim-7.0-public-all corpus is currently at approximately 1.25 billion tokens, which is why the focus now lies on the thematic diversity of the linguistic material and the database is being completed with texts from previously underrepresented areas of social sciences as well as natural sciences. This is due to the fact that in certain cases even a very small or specific area, whether a scientific discipline or a genre of literature, can be noteworthy.

The way specialized corpora are built is based on the unique needs of specific research, most often the needs of linguistics and terminology, but even other scientific areas as well. Their extent is significantly smaller than that of general corpora. An example of such a corpus is the Corpus of Religious Texts blf-2.0 [2], which

* **Marek Debnar**
Department of Journalism, Faculty of Arts, Constantine the Philosopher University, Nitra, Slovakia
E-mail: mdebnar@ukf.sk

contains 16 million tokens, or the Essay Corpus ess-1.0-all, with more than 5 million tokens.

3. The Issue of Genre and Sources

The vastness of the essay genre and its penetration into several areas of social science make any attempts at a clear definition of the essay significantly more difficult. Efforts to define the genre more accurately are also complicated by the confusion which is caused by the fact that the term "essay" is used in different meanings based on the tradition that each instance of the word refers to. This is why the first step of this research is excluding those texts that are typically referred to as *essays* but can be classified as schoolwork. Afterwards, the perspective of the European tradition is assumed, which means that the term *essay* is only used to refer to texts with certain literary qualities.

As early as during the preparatory stages of this paper (which consisted of necessary technical procedures), it became clear that simply excluding schoolwork and theses from the set of essays would not suffice. Despite the fact that the essayistic texts from the Slovak National Corpus (SNC) never included schoolwork, the list of texts had several type variations. Although in most cases essays were categorized as literary texts, e.g. *Etela Farkasova: Uvidiet hudbu* a *ine eseje – "Seeing Music and Other Essays"*), we have also found cases where texts classified as essays were assigned to the category of either journalistic texts (e.g. *Lubomir Durovic: Europeizacia Balkanu, nie balkanizacia Europy – "The Europeanization of the Balkans, not the Balkanization of Europe"*) or professional texts (*Bruno Latour: Nikdy sme neboli moderni – esej* o *symetrickej antropologii – "We Have Never Been Modern – an Essay on Symmetrical Anthropology")*. Shorter professional texts published in journals or collective monographs dealing with the essay genre that simultaneously tried to bring about a feeling of essayistic writing were no exception. Examples of these are *Milos Horvath: Spory* o *esej* a *jej miesto* v *slovenskej kulture* a *kulturnej historii* (*"Disputes over the Essay and Its Place in Slovak Culture and Cultural History"*) and others.

These texts had been collected in the corpus since 2005 and annotated by different annotators. Since the aim of the study was to determine the set of essayistic texts as accurately as possible, a decision was made to go through all the annotations again and check them. It turned out that the aforementioned text by Lubomir Durovic, which was published in the *Pravda* daily, was in fact not an essay (as its original classification indicated) but rather a feuilleton and the book by Bruno Latour (although its title explicitly states it is an essay) is not an essay but rather a scientific monograph. The same applied to the text by Milos Horvath – although it deals with the topic of the essay, the text itself is a study.

After a thorough inspection of all the texts, which was the first step towards the creation of an essay subcorpus (Genre: ess), only half of the original two hundred entries in SNC that were originally categorized as essays remained. These approximately one hundred texts, most of which are books (as can be seen from the Medium statistical analysis), were then used to create the first model of the essay subcorpus.

A change which meant a significant expansion of the corpus came with the acquisition of rights to the essays published by the Forum project on the website www.salon.eu.sk. Out of the originally more than 700 texts, over 400 were included in the corpus. The largest part of the excluded texts consisted of texts published in Czech. Problems were also caused by occasional errors in encoding, which caused issues during text conversion. In the final stage of the first version of the ess-1.0-all essay subcorpus, which was created in July 2016, the subcorpus now contains approximately 500 texts (books and texts published online) from the essay genre. The percentage is as follows:

The **Medium** key [3] for the essay genre:

lib (book)	88.16%
net (texts found online)	10.83%
ebk (e-book)	0.62%
jou (magazine)	0.36%
npu (unpublished texts, manuscripts)	0.03%

In addition to texts written in Slovak, we have also included Slovak translations of foreign-language essays, e.g. Virginia Woolfe: *Vlastna izba* (*A Room of One's Own*), some of T.S. Eliot's *Essays* as well as other authors (the proportion of foreign-language texts to Slovak ones is indicated by the Origlang statistical analysis).

The **Origlang** key [4] for the essay genre:

slk (Slovak)	58.62%
eng (English)	21.05%
hun (Hungarian)	4.33%
cze (Czech)	3.42%
rus (Russian)	3.25%
nld (Dutch)	1.91%
ger (German)	1.47%
fra (French)	1.36%

In regard to the gender of the authors whose texts were included in the essay subcorpus, 90.44% were men, 7.79% women and the rest were mixed collectives of authors.

4. The Scoring Method of the ess-1.0-all Subcorpus

To enable the use of essayistic texts for further analysis, a set of unique type-genre characteristics has been assigned to texts classified as essays in the SNC, similarly to the way novels or

monographs are tagged. Before proceeding to a closer description of the type-genre specification of the essay according to the system of structural tags used in the SNC, it is necessary to outline the character and method of recording this information.

Recording the basic bibliographic and type-genre metadata is part of primary text processing, which is collectively referred to as type-genre annotation (TGA) and consists of 35 entries that characterize a text. These entries are used to categorize each text into a specific factual, thematic and semantic field, which makes it possible to study the current form of written language and indirectly study linguistic meaning in a constantly growing database of texts.

TGA is performed by assigning fixed values, which form the core of type-genre annotations of texts, to the subkeys of three basic keys: the *domain* (non-fiction or social science), *genre* and *type* of text. During annotation, the annotator has the understanding that the text itself carries a certain intention that it is created with. A dissertation thesis is written with a different intention, a different type of language and for different readers than a newspaper report, a statute book or a collection of poems. The same applies to essays.

The interconnection between the *genre* and the *type/subtype* of a text also begs the question of genre classification and transitional types in individual sets of texts. In other words, there are different variations of the *type* or *subtype* values for each value of *genre* and vice versa. But even the *genre* itself is divided into *subgenres* – e.g. the novel or the short story are divided into the following subgenres: prose, children's literature, detective fiction, travelogue, sci-fi, fantasy, non-fiction, women's novel, adventure novel, etc. These variations are determined for each text individually and are the result of a thorough research of the text by an annotator. While variations of the *subtype* and *subgenre* within one genre are rather common, variations of the *type* within one *genre* are much rarer. It is this transitive character that has until recently been most characteristic of the set of texts labelled as essays in the corpus.

When re-checking the texts labelled as essays, the goal was accurately determining the individual sets that had transitional values of *type* for this genre. Just like in the cases given above, other cases also revealed that this set can be unified if we apply stricter rules for genre classification on these texts. The result was a certain unification within the essay genre, which no longer has variations in *type* (which is now stabilized as *literary text*) but rather in its *domain* and *subdomain* (the areas of professional literature and non-fiction).

5. An Outline of Semantic Fields in ess-1.0-all

In order to improve the thematic structure and categorization of linguistic devices, text annotations in the SNC database include keys which delimit the semantic field of each annotated text by indicating the non-fiction and social-science *domain* and *subdomain* that the text is related to. The *domain* is semantically superordinate to the text, which manifests itself in the *type* and the choice of characteristic linguistic devices, i.e. *genre* of the text. From the perspective of the thematic categorization of all texts labelled as essays, the following statistical analysis has arisen in the final version of ess-1.0-all:

The **Domain** key [5] for the essay genre:

ars (art)	52.21%
hum (the humanities)	17.37%
blf (faith, the supernatural)	16.72%
ins (interdisciplinary sciences)	3.90%
MIX (mixed value)	3.47%
nat (natural sciences)	3.38%
lif (lifestyle)	2.37%
ecn (economics, management)	0.44%
tec (technology)	0.10%

Individual *domain* areas are then further categorized in the *subdomain* key. The *subdomain* contains 53 required values which further represent specific thematic areas of the superordinate set of *domain*, e.g. *art* is further divided in the subdomain key into: literature (literary science and criticism), theatre (theatre studies and criticism), architecture, film, music (opera and ballet) and visual arts (which also include photography and sculpture). Other areas of *domain* have similar subdivisions, which is especially true for the areas of the humanities, natural sciences, law, technology, economics, industry, faith and lifestyle.

The following statistical analysis indicates the percentage of these areas in the essay subcorpus:

The **Subdomain** key [6] for the essay genre:

lit (literature, literary science and criticism)	50.95%
rel (religion, faith, cults)	16.72%
pol (political science)	8.72%
YYY (undefinable value)	7.40%
phi (philosophy, ethics, aesthetics)	4.32%
eth (ethnology, ethnography)	2.54%
env (environmental science, ecology)	2.53%
sct (social life)	1.86%
mus (music, opera, ballet)	0.88%
his (history)	0.82%
bio (biology)	0.70%
eco (economics, banking)	0.41%

Other subdomains only have trace values or mixed values. The undefinable value YYY always appears if the superordinate set of keys contains no more further specified subsets, such as the domain ins (interdisciplinary sciences).

6. The blf-2.0 and ess-1.0.-all Subcorpora

A specialized corpus of texts from the thematic area of religious texts, faith and the supernatural labeled blf-2.0 was made available in 2014 with the extent of almost 66 million tokens (i.e. it is ten times more extensive than ess-1.0-all). The subcorpus was created in the SNC primarily for the purposes of research in the area of religious terminology, which had been pushed aside before 1989 due to political and ideological reasons [7]. The subject of religious terminology is closely connected to the subject of interpreting the concepts of certain representatives of religious philosophy [8], social philosophy [9] and religious studies [10]. However, this exceptionally interesting connection is yet to receive academic treatment.

The treatment of the blf-2.0 and ess-1.0-all subcorpora differs in one significant aspect – as has been demonstrated, the ess-1.0-all subcorpus is built on the *genre* key, which enables a rather rich semantic diversity that manifests itself in the variations of the *domain* and *subdomain* values. The blf-2.0 subcorpus is built on the *domain* key and thus it only defines the semantic field of the texts for three *subdomains*: rel (religion, faith, cults), teo (theology), exc (the supernatural, occultism, magic, astrology). However, this limitation enables a great variability of types and genres – from religious poetry, hymnbooks and religious children's books through sermons to scientific papers on these topics.

Therefore, a comparison of the semantic fields of these two subcorpora using *domain* and *subdomain* would not yield any relevant results, with the exception of the aforementioned penetration of essays into the area of religious texts, which is a 16.72% correspondence at the level of *domain.* Thus a decision was made to compare the quantitative occurrence of the most frequently occurring lexical variants.

Let us present the ten most frequently occurring words in the blf-2.0 subcorpus (excluding conjunctions and prepositions):

- *clovek* (man) 238,808 (occurrences)
- *boh* (god) 213,174
- *zivot* (life) 198,093
- rok (year) 183,392
- cirkev (the church) 144,736
- Jezis (Jesus) 133,717
- den (day) 99,755
- laska (love) 97,376
- otec (father) 93,531
- slovo (word) 93,267

The ten most frequently occurring words in the ess-1-0-all subcorpus (excluding conjunctions and prepositions):

- clovek (man) 17,222 (occurrences)
- zivot (life) 10,440
- svet (world) 8,998
- boh (god) 8,408
- cas (time) 6,621
- povedat (say/tell) 6,065
- vediet (know) 6,056
- slovo (word) 5,703
- sam (alone) 5,569
- kniha (book) 4,504

As can be seen from the top positions of the frequencies of occurrence, both subcorpora are mutually interconnected and indicate the thematic character of essayistic and religious writing in that both of them try to grasp humans in their entirety. Of course, a deeper interpretation would require a more detailed statistical analysis, such as the frequencies of occurrence for the most common multi-word phrases, etc. However, the aforementioned data is sufficient in order to demonstrate the basic possibilities that computer processing of a certain set of texts makes possible.

Both specialized subcorpora are publically available on the website htttps://bonito.korpus.sk and can be searched using the NoSketch Engine [11] statistical and search tool. Further processing of selected sets of texts using other corpus tools is also possible.

7. Conclusion

Having illustrated the way texts are annotated using the model example – a type-genre description of texts labeled as essays in the SNC – the next goal is documenting further ways how general and specialized corpora can be used to analyze larger texts. Eventual similarities and differences between these sets could shed even more light onto the subject of using language and terminology in individual areas of the humanities. However, research that would take into account all possibilities of using this potential and would also be able to present a high-quality quantitative and semantic analysis of text genres is yet to be conducted.

Acknowledgement

This submission was created as part of a research assignment for the VEGA 2/0107/14 grant "Hypermedia Artefacts in a Post-digital Era".

References

[1] Searches in the main corpus as well as the subcorpora of the Slovak National Corpus can be performed via https://bonito.korpus.sk.

[2] http://korpus.sk/blf.html

[3] **Medium** is a key used to determine the so-called textual medium or source. Values such as *book*, *magazine* or *newspaper* are supplemented by further values such as *course literature*, *journals*, *internet* and *unpublished* or *one-off texts*. In 2014, the *e-book* value was added.

[4] The **Origlang** key indicates the language in which the original text was written.

[5] **Domain** is a key which determines the domain (thematic area of a certain activity or knowledge) and which is connected to the largest fixed set of values. By correctly determining the domain, i.e. by correctly assigning the text to a specific thematic area, the semantic field of the expression used in a search is efficiently narrowed down.

[6] **Subdomain** is a key used to further categorize the superordinate thematic area of a certain activity or knowledge (domain). It consists of a fixed set of 53 values.

[7] More on this topic can be found in the following article: SIMKOVA, M.: *Religious Texts and Terminology in the Slovak National Corpus* (in Slovak). In: Jan Durica (ed.): *Brief Dictionary of Catholic Theology* (in Slovak), Proc. of intern. conference, Trnava: Dobra kniha, 2015, 77-98. ISBN 978-80-7141-955-6

[8] KRALIK, R., PAVLIKOVA, M.: *The Reception of Kierkegaard's Work in Slovakia* (in Slovak), *Filozofia*, vol. 68, No. 1, 2013, 82-88. ISSN 0046-385X; KRALIK, R.: *The Reception of Soren Kierkegaard in Czech Language* (in Czech), *Filozoficky casopis*, vol. 61, No. 3, 2013, 443-351. ISSN 0015-1831.

[9] JUROVA, J.: On Etzioni's Concept of a Responsive Community. *European J. of Science and Theology,* vol. 12, No. 3, 2016, 101-111. ISSN 1841-0464.

[10] KONDRLA, M., PAVLIKOVA, M.: From Formal Ethics to Existential Ethics. *European J. of Science and Theology,* vol. 12, No. 3, 2016, 101-111. ISSN 1841-0464; KONDRLA, P., KRALIK, R.: The Specifics of Mission of the Thessalonians Brothers and the Potential for they Actualization (in Slovak), *Konstantinove listy*, vol. 9, No. 2, 93-99. ISSN 1337-8740; VALCOVA, K., PAVLIKOVA, M., ROUBALOVA, M.: Religious Existentialism as a Countermeasure to Moralistic Therapeutic Deism. *Communications - Scientific Letters of the University of Zilina*, vol. No. 3, 2016, 98-104. ISSN 1335-4205.

[11] *https://nlp.fi.muni.cz/trac/noske.*

Martin Hetenyi*

THE PLACE OF CYRILLO-METHODIAN HERITAGE IN THE CHRISTIANIZATION OF KIEVAN RUS

Constantine and Methodius laid important foundations for the diverse culture of Eastern Slavic peoples. In the spread of the ideals of this culture, Christianity played an important role. An official adoption of Christianity in A.D. 988 had several important features: development of art, craft, literature, sacral architecture, etc. It is thus understandable that in eastern Slavic countries, the cult of St. Constantine and Methodius began to grow immediately. However, there is a lack of information about the way the brothers' work affected Eastern Europe and the difficult journey it must have experienced. Both Slovak and Czech historiography provide only rough outlines of these matters. Researchers in Slovakia and the Czech Republic offer no detailed discussion of the huge contribution of Constantine and Methodius to the culture of Eastern Slavs. This condition may be the result of both limited source materials and limited access to the sporadically discovered materials.

Keywords: *Constantine and Methodius' cultural heritage, Kievan Rus, Slovak and Czech historiography.*

1. Introduction

The life and work of Constantine (Cyril) and Methodius have close ties with the history of Great Moravia. Both Slovak and Czech literature deal significantly with this history. Further, we know that, following the death of Methodius in 885, the two brothers' work did not disappear but continued to affect other parts of Europe. The scholarly brothers from Solun were expelled from Great Moravia, yet their work had continued application in Bohemia, Bulgaria, Croatia, Serbia, and Byzantium as well. In the Slavic world, it was primarily the work of Bulgarian Empire scholars that formed the most decisive action for cultural development and Christianization. And more than a century later, the next generations of scholars stimulated the spiritual environment of East Slavs concentrated in Kievan Rus. Thus the Great Moravian cultural tradition found continuance and settlement there also.

The Solun brothers' efforts began with the creation of an alphabet that copied phonetic peculiarities of the language of Slavic nations. It was by this means the brothers obtained the learning their work needed [1]. A further step was translation of the Bible and other important texts into language with the new script. The brothers were the first to translate religious books so that a majority of people could understand them. Along with this educational work, the brothers evangelized the Slavic nations.

Some of the scholars expelled from Great Moravia found sanctuary in Bulgaria. Its ruler had a strategic interest in expanding the Slavonic liturgy around the country. It was a way to break free from the influence of Greek clergy and the Byzantine ecclesiastical environment. Boris, the Bulgarian ruler, accepted Clement, Naum, Angelarius and Constantine of Preslav, together with their contributions to the development of Slavonic literature. Across the Bulgarian empire, the followers of Cyril and Methodius founded significant cultural centers, including monastic schools in Ohrid and Preslav. Here important thinkers and teachers of the next generation were educated. From these spiritual centers Slavic culture as well as liturgical language spread to other countries – Serbia, Dalmatia, Bosnia and Rus [2].

2. Political and religious conditions in Kievan Rus

In Kievan Rus, Slavic people worshipped multiple deities during the 9th and 10th centuries. Yet long before the final adoption of the Christian religion in 988, Kievan-Rus people were familiar with Christianity as a result of active business contacts. The pagan and Christian cults of Kievan Rus existed next to each other, and they influenced each other directly [3].

In mid-10th century Constantinople, Princess Olga of Kievan-Rus voluntarily underwent Christian baptism as

* **Martin Hetenyi**
Department of General and Applied Ethics, Faculty of Arts, Constantine the Philosopher University, Nitra, Slovakia
E-mail: mhetenyi@ukf.sk

she became a goddaughter of Emperor Constantine VII Porfyrogennet (913 – 959). She also took the Christian name of Yelena. The emperor expected that Olga's state would be strengthened through the creation of a separate church. Olga also wanted to see Christianity take hold in Kievan Rus. To this end, she first flirted with Byzantium, then with the Western church. However, such efforts failed.

Despite the fact that Olga converted to Christianity without difficulty, all attempts failed to convince her son Sviatoslav to adopt the new religion [4]. Following the death of Olga in 969, Sviatoslav brought back an anti-Christian type of paganism. But while the middle of the 10th century did not see Kievan Rus become a Christian country, Christianity continued to grow there. This created conditions for the integration of Kievan Rus with the Byzantine cultural sphere. Thus in 988, the reign of Sviatoslav's son Vladimir witnessed a final decision to adopt Byzantium Christianity. Vladimir's Christian conversion, and his political and military dominance, played a key role in the adoption of Christianity as the official religion of Kievan Rus. In comparison with his predecessors, Vladimir had a freer hand in decisions about his people's public worship, and how much they should be involved in the matter. At first, Vladimir, representing the Rurik dynasty, supported paganism, as indicated by an occasional persecution of Christian Rus' people. As soon as Vladimir's control of the country stabilized, the question of the state structure loomed large. But for this requirement, paganism was insufficient and did not meet the needs of a quickly developing Russian society. Further, foreign-political concerns played an important role in the matter. For only by adoption of Christianity could the Kievan prince act as an equal sovereign within Europe's growing Christian universe. Only such recognition could ensure international acceptance of the Kievan Rus state. Thus it was just a matter of time for a Kievan Rus ruler to adopt Christianity as an official religion [5, p. 248].

With Vladimir's baptism in 988, Kievan Rus officially adopted Christianity. Also tied closely with Vladimir's baptism was his marriage to Anna, sister of the Byzantine Emperor Basil II (976-1025). The latter action reflected a beginning alliance with the Byzantine empire, whose affairs Vladimir had just given significant military help against the Bulgarians. Such action of course lifted relations between the two regimes to a potent new level. Such alliance led to broad-reaching Russian cultural developments that have persisted to the present day. The decision to receive Byzantine baptism, and Basil II's pleas for military assistance, gave Vladimir had a prime opportunity to impose his own wishes. The result was his unprecedented marriage to a member of the Byzantine ruling dynasty, and the integration of his country into the sphere of Byzantine Christianity and culture. All this was enhanced by the splendour of Byzantine church ceremonies and buildings, which greatly impressed Vladimir and his people. But significantly, as depicted by *Primary Chronicle*, the transition from paganism to Christianity is not a fundamental breakthrough. The emphasis rather is on dynastic continuity [6].

In Byzantine thought, all parts of the empire should have baptized rulers who made efforts to Christianize their country. As it was for Roman Catholic worship, so also for Byzantine worship, a liturgy using uncanonical language was unusual. In the case of Byzantine Christianity, however, the acceptance of Slavonic language in liturgical processes was a matter of sound practice. And it reflected the necessary methods of missionaries in the pagan world. Overall, medieval Christian missions focused on prepared liturgical models. One of the few exceptions occurred when Hadrian II and John VIII allowed Slavonic liturgical language under Roman Church jurisdiction in Great Moravia, Bohemia, Poland, and other places. But this was a permission that continued at some length only in Croatia. Yet Eastern Christian missionaries from Constantinople tried to respect the positions of local sovereigns. In the case of the Slavs, religious texts were adapted into Slavonic language and culture. The Slavic environment required a longer period for missionaries to be familiar with indigenous religious traditions [7]. A reflection on missionary work in Great Moravia must respect the fact that Constantine and Methodius were preaching and educating in an environment already acquainted with Christianity from the West [8]. The Solun brothers called themselves defenders of church unity, and their work represented a mediation between the cultures of the Byzantine and Roman worlds, Of course the efforts to spread Christianity among the Russians also stressed efforts to strengthen Byzantine political and cultural influence.

In terms of international politics, the adoption of Christianity meant that the Kievan Rus entered into the community of European countries. This was true even though the Kievan Rus formed part of the Byzantine political-cultural universe. Within this development, the new monotheistic religion accelerated the formation of state ideology as the official religion. It gave a "sacred sparkle" to the prince's reign. Furthermore, as concerns centralization of the state, the position of Kiev, the main religious center of Rus, became stronger. Now also there were efforts to organize an education system. Even though the Christianization of the Rus was a complicated and painful process [9], numerous dioceses were set up throughout the country by the end of the 10th century. At first, it was Greek clergy who came to Rus. The literature they brought influenced both church affairs and other aspects of life. The Archbishop of Kerson had the first oversight of church organization in Rus. Undoubtedly, the Byzantine missionaries used Greek language in liturgies they brought. These however were largely incomprehensible for the broad public and even the upper classes. Only their magnificence could be impressive. Clearly Vladimir wanted to

have Christian contacts beyond the Byzantine representatives, and soon Bulgarian missionaries with Slavonic liturgy and literature appeared in Rus. Immediately, Russian church leaders began using Slavonic language worship materials. Since it had the support of the Rus' sovereign, this development had to be tolerated by the Byzantine missionaries [5, p. 252]. And after 1018 and the destruction of the Bulgarian Empire by Basil II, the inflow of Bulgarian and Serbian clergy to Rus increased significantly.

During the reign of Vladimir's son, Yaroslav the Wise (1015/1016-1054), the Russian church's position stabilized [10, pp. 131-132]. There were 9 dioceses under a Metropolitan of Kiev. Twenty-three metropolitans then held office until the Tartar invasion. Seventeen of these leaders were Greeks who kept up strong Byzantine influences [11, p. 140]. The efforts of Yaroslav to sever the ties with Constantinople had no long-term success. He did appoint Ilarion, an educated priest of local origin, as Kiev metropolitan. But Greeks again took over the post after the prince's death.

The cultural and political expansion of Kievan Rus is especially notable in the area of artistic craft. This refers primarily to the construction of buildings with sacral architecture, and to religious literature. From the beginning, church art in Kiev was distinguished by its Byzantine character [12] Russian literary writings also arose and developed at an early point (9th-11th centuries). Very appropriately, such literature employed the liturgical Slavonic language. It came to Kievan Rus mainly from Bulgaria, but also from Bohemia, since Russian princes had active contacts with the country. Much of this writing was religious literature that, since the end of the 10th century, had been coming to Rus from Byzantium through Bulgarian translations. The introduction of Old Church Slavonic into Christian liturgy, where it gradually prevailed, and the creation of literature in a native language spread not just by clergy but by tellers, musicians and actors, among princes and boyars, and common folk, had an epochal significance [5, p. 268]. As used in everyday life (rather exceptional in Europe), the Cyrillic alphabet, also became an effective stimulus for spreading religious and secular literature in Rus [13]. Paradoxically, in the 11th and 12th centuries, the interaction of Russian and other Slavonic literary influences started to turn back, while several Russian works influenced subsequent writings of Slavs of the south and west.

As to origin, the literature of Rus can be divided into Slavonic literature from Bulgaria (both translations from Greek and occasionally Latin) and original writings. As to character, such literature consists of religious writings (various genres, mainly sermons, lives of the saints, hymns, etc.) and secular works (annals, legal manuals and codices, epical works and others). Bulgarian priests brought to Rus not only Slavonic liturgical books but all other works created by Bulgarian literary schools during the reign of Simeon (893 - 927) and Peter (927 - 989). They even brought *Zakon sudnyj ljudem*, a work created by Methodius in Great Moravia [14, p. 276]. One very significant 11th century work is a Russian chronicle called *Povest' V remennykh Let (The Tale of Bygone Years)* - also referred to as *Nestor's Chronicle* or *the Kievan Chronicle*. The chronicle ends with a record dated in 1113. It contains narrations about the princes of the Kievan Rus, about battles and relations with other nations, and about Christianization of the state. It also involves testimonies concerning political developments in Great Moravia [10, pp. 40-42].

Equally important is the oldest Russian set of laws, *Russkaya Pravda (Russian Justice of Rus' Truth) – Pravda of Yaroslav.* The first report has the date 1016. Completed by the end of the 13th century, the work describes the situation shortly after adoption of Christianity. Other works are *Primary Chronicle* (1093), *Kormcaja Kniga*, *The Reading Concerning Prince Boris and Gleb* (2nd half of the 11th century), *The Life of Feodosij Pecherskij* (*Bibliography of Feodosij*;11th-12th century), *The Sermon of Law and Grace* (*Treatise on Law and Grace*, *The Word of Law and Blessing*, 1037 – 1050), *The Pskov Chronicle*, *Izbornik of Prince Sviatoslav Yaroslavych*, a travel book *The Pilgrimage of Daniil, Igumen of the Russian Land* (beginning of the 12th century), *Instruction* (by Vladimir II Monomakh). Secular literature is excellently represented by a poetic, historical and political document called *The Tale of Igor's Campaign* (1185).

Very well-preserved and valuable literary works come from Novgorod, one of the main centers of Rus. Novgorod reached independence during the reign of Yaroslav the Wise. Among the most significant of these works are *Poucenje k Bratii* (containing their own literary texts and translations from Greek; mid-11th century), so-called *The Ostromir Gospels* (1056 - 1057), *Novgorod Codex (*Толочко 2003), Novgorod chronicles, and various documents, or g*ramotas* written on birch bark in the Slavonic language [15]. Certain episodes in the early history of the East Slavs were also recorded by Latin sources (so-called *Bavarian Geographer*, *Annales Bertiniani*, 9th century). There also are works of Byzantine and Arabic origin (writings by Arabian and Persian scholars - Abu 'Ali Ahmad ibn 'Umar ibn Rustu, Abu l-Qasim 'Abdallah ibn Hurdadbiha, al-Istachriho, al-Mas'udiho and others). In his famous work from the mid-10th century, *De administration imperio*, Byzantine emperor Constantine VII Porfyrogennet deals with the issue of the East-Slavic settlement [16]. In the following centuries, many Cyrillic scripts were created in Kievan Rus. In the early 1990s, investigators found some 30 texts dated in the 11th century, and 65 texts of original Kievan-Russian works from the 12th century, these mostly items of religious literature [17]. Nevertheless, only indirect and fragmentary reports with specifics on the spread of Constantine and Methodius' work have been located. Besides difficulties with the lack of sources, the one-sided orientation

or fragmented elaboration of various writings also cause serious problems. And difficulties often arise from another issue. This is the lack of clarity about whether a translation may be considered an original effort or an adapted work. In the science of book appraisal, the latter is one of the most complexes of issues. The most significant of Greek translations is *The Chronicle of John Malalas.* Translations of a religious and philosophical character originated mainly in the Kievan literary school of Yaroslav the Wise [18].

Certainly East Slavic perceptions of Constantine and Methodius focused on their merit for a preparation of scholars concerned with spiritual work. As early as the mid-11th century, these were followers in other generations whose actions expanded their cult. As regards church worship singing, there were comparisons of the two brothers' spiritual dimension with biblical apostles. After all, Constantine and Methodius have been known in history as the Apostles of the Slavs.

After the death of Yaroslav the Wise, the Byzantine Empire experienced gradual decline, and then isolation and fall. In the 13th century, Mongolian hordes caused Rus political and cultural spheres to recede. Thereafter the cult of Cyril and Methodius weakened significantly. But though references to the brothers were less frequent, their spiritual message was not forgotten. Efforts by local Christian churches played a crucial role in this regard. In the 19th century, at the time of Ukrainian and Russian national revival, the cult of Cyril and Methodius enjoyed a period of rebirth [19].

3. Interpretive schemes of the problematic in Slovak and Czech historiography

Slovak and Czech historiography provides only little information on how the work of Constantine and Methodius spread in Eastern Europe, and how difficult the process was. One finds only basic outlines of these concerns. Recent relevant works of Slovak and Czech medievalists on the Slavs do mention the baptism of a Kievan Rus ruler. They also cover the general spread of Slavonic liturgy from Bulgaria. The latter action was crucial to the transmission of the cultural and spiritual values of Constantine and Methodius' works to the East Slavs. But some more extensive publications offer a closer look at that topic. A leading Czech expert on Byzantine history, Frantisek Dvornik has examined the heritage of Cyril and Methodius in Kievan Rus on a long-term basis. His claim is „I*t is still not clear who brought Slavonic liturgy there. The keenest propagators of Slavonic literature were Bulgarian missionaries. However, we do not know when the first Slavic princes really came to Kiev from Bulgaria."* As concerns religious Slavic literary language created by Constantine and Methodius, Dvornik also writes in his monograph *Byzantine Missions Among the Slavs*: *„...being transferred from the Balkans to Russia, it also became an official language of the Russian Church and a literary tool of Russian intellectuals... This might have happened before the Emperor Basil II destroyed the First Bulgarian Empire (1018). It is possible that some Bulgarian priests came to Russia with the army of prince Sviatoslav who was in 972 defeated by the Byzantines in Bulgarian territory and was forced to return to Kiev"* [14, pp. 276-277].

Josef Vasica is a philologist who wrote on the issues of linguistics and literary science in the past century (e.g. the continuity of Cyrilo-Methodian literary production in the Slavic environment). Also significant is *The Introduction of the Slavonic Liturgy and the Byzantine Missionary Policy,* a study by Vladimír Vavrinek, a Czech expert on Byzantine history [20] Vavrinek also put his thoughts on the subject in a recent monograph (2013). It examines the Cyrilo-Methodian heritage preserved by Slavs of the South and East. Thus the Bulgarians passed Slavic religious education on to other Slavic nations: *"Thanks to adoption of Church Slavonic literature and Slavonic liturgy, on the edge of the Byzantine Empire, there arouse a line of countries that were politically independent but internally connected with it through their culture and spirituality..."* However, we have to agree with Vavřínek that some of the ideas of Constantine and Methodius' were not preserved. For example, South-Slavic and East-Slavic heirs of the Solun brothers did not take over the conception of ecclesiastical universalism [21].

Another significant expert on Byzantine history, Alexander Avenarius, can be regarded as one of a few authors who compare diverse relationships of Rus with the surrounding countries through an exact critical analysis. In his book *-Byzantine Culture in the Slavonic Environment in the VI. - XII. Centuries,* Avenarius notices that, starting with the reign of Yaroslav, translations of Byzantine works (besides the undoubted borrowings from Bulgaria). supplemented the Russian literature. Russian art thus responded mainly to Byzantine inspiration, and not Bulgarian stimuli. Apart from his deflation of Bulgarian influence, as proved by specific examples, Avenarius refers to a long and geographically extensive Cyrilo-Methodian culture. This he thinks flourished because of its linguistic and national character, its recognition of liturgical and literary Slavonic language, and its role in educating society (these items elude not only from the Byzantine, but also Western cultural concept). Avenarius compares the transformational factors and functions of Cyrilo-Methodian heritage with developments in various countries [22]. In its critical character, its courage to put forth new hypotheses, and its searching for answers to major questions. Avenarius work provides researchers with challenges and inspirations for further thoughts and studies.

As to other works, one should highlight a book written by three authors, Jarmila Bednarikova, Ales Homola and Zdenek Merinsky. The title is *Migration of the Nations and the East of Europe: the Byzantine Empire, the Slavs, the Arabs.* Thanks

to this publication's concern for further exploration, we can learn that baptism was not a random decision, but was the culmination of a long-lasting social process. However, under the influence of the Bulgarian Ohrid, Slavonic liturgy and liturgical language, introduced to Great Moravia by Constantine and Methodius more than a hundred years earlier, made a breakthrough in Rus. It *"certainly helped to speed up a process of Christianization, a process of unification of the East Slavic tribes and a final Slavinization of Varangians... Use of Church Slavonic language as a liturgical language, which quite quickly prevailed over Greek, had a positive impact on quicker process of Christianization"* [5, pp. 251-252].

Miroslav Danis, a famous Slovak expert on medieval history, summarized the growth Cyrilo-Methodian influence among the East Slavs in his *History of European Middle Ages I. Early Middle Ages*.: He comments:*"Christianization in Rus was accelerated thanks to the introduction of Slavonic liturgy and literature ... the Bulgarian missionaries, since the end of the 10th century and mainly after the fall of First Bulgarian Tsardom in 1018,were looking for sanctuary from Greek-Byzantine elements in the surrounding countries."* The Byzantines were likely to support a departure of Slavic priests from Bulgaria and the Balkans in order to get rid of dissatisfied intellectuals who could endanger their positions in regained Bulgarian provinces [23, pp. 198-199]. This thesis had already been advanced by Frantisek Dvornik [14, p. 276]. Miroslav Danis continues: *"Slavonic liturgy became a communicative pillar of the Orthodox Slavonic Churches in Europe"* [23, p. 193]. In the same work, its co-author Vincent Mucskain informs readers about the Solun brothers' heritage in Eastern Europe: *"The largest concern in Christianization of masses of population belongs to the monks who came from Byzantium, mainly from Bulgaria occupied by Constantinople (a definite defeat in 1018). They brought Church Slavonic language as a liturgical language and the Cyrillic alphabet thanks to which Russian Church became one of the heirs of Constantine and Methodius' work"* [24].

A more recent work, *History of Medieval Europe,* by Vaclav Drska and Dana Pickova states: *"The introduction of language (intelligible to population) into the church not only increased an interest in a new confession but also contributed to a final Christianization of originally Varangian ruling class"* [11, p. 139].

Due to a lack of sources, and also the availability of sporadically discovered materials, Slovak and Czech researchers do not initiate discussions on the huge contributions of Constantine and Methodius to Eastern Slavic culture. After 1989, scholars put greater emphasis on the role of Christian dogmatic in the cultural heritage created by the Solun brothers and their followers. In many scientific fields (theology, linguistics, cultural studies, etc.), various interferences between East and West have had much attention, especially as to the late Middle Ages onward [25]. A younger generation expert on Byzantine history, Martin Hurbanic, has carried out some broad research. In his dissertation thesis, Hurbanic describes stages of acceptance and a subsequent transformation of Byzantine ideological stimuli of Rus in the pre-Mongolian period [26]. For those interested in the cultural history of the East Slavs, there are inspiring new collections called *Cultural, Spiritual and Ethnic Roots of Russia.* There is also a collection of works completed by younger generation Praguean experts on Russian history. It raises a broader range of issues [27].

4. Conclusion

One need not emphasize that the Kievan Rus adoption of Cyrilo-Methodian tradition was preceded by contacts with Christianity and education. The primary importance of the Solun brothers' heritage lies in its contribution to and preservation of the tradition's continuity. Sts. Constantine (Cyril) and Methodius laid the foundations of culture and education in numerous Slavic communities. The conditions they created then developed for centuries. As a specific stimulus and a catalyst of the process, Christianity played a significant role in the adoption of Cyrilo-Methodian ideals.

Acknowledgements

This article is supported by a scientific grant agency of the Ministry of Education of the Slovak Republic VEGA 1/0039/14 and VEGA 1/0615/15.

References

[1] TANESKI, Z.: Some Theories and Historical - social Conditions of Slavonic Script and Literature (in Slovak), *Konstantinove listy*, No. 1, 2008, 110-124. ISSN 1337-8740.

[2] IVANIC, P., HETENYI, M., HURBANIC, M., HUSAR, M., LUKACOVA, M.: *Slovania a Byzancia v ranom stredoveku* (in Slovak), Nitra: Univerzita Konstantina Filozofa, 2014. ISBN 978-80-558-0668-6.

[3] SHEPARD, J.: *Rus* (in Czech). In: Christianization and the Rise of Christian Monarchy: Scandinavia, Middle Europe and Russia from 10 to 12th Century, Praha: Argo, 2013, 370. ISBN 978-80-257-0835-4.
[4] HOMZA, M.: *Mulieres suadentes: Persuasive Women* (in Slovak), Bratislava: Luc, 2002, 34. ISBN 80-7114-372-3.
[5] BEDNARIKOVA, J., HOMOLA, A., MERINSKY, Z.: *Migration of Nations and the East of Europe. Byzans, Slavs, Arabs* (in Czech), Praha: Vysehrad, 2006. ISBN 978-80-7429-306-1.
[6] KOMENDOVA, J.: *Models of Apostolic Activity in the Oldest Literature Origins of Kievan Rus* (in Czech). In: The Meadows of Gold and Mines of Gems, Cerveny Kostelec: Pavel Mervart, Praha: Univerzita Karlova, 2006, 168. ISBN 80-86818-30-6.
[7] HURBANIC, M.: *The Byzantine Political Ideology in the Missionary Practice of 9th Century (Encyclic Ad archiepiscopales thronos per orientem obtinentes of patriarch Photios)* - (in Slovak). In: Pohanstvo a krestanstvo, Bratislava: Chronos, 2004, 125-138. ISBN 80-89027-12-1.
[8] IVANIC, P.: *Pre-Cyrilo-Methodian Missions in the Territory of today´s Moravia and Slovakia from the perspective of Czech and Slovak Historiography* (in Slovak). In: The Spiritual, Intellectual and Political Background of the Cyrilo-Methodian Missions before its Arrival on the Great Moravia, Nitra: Univerzita Konstantina Filozofa, 2007, 46-59. ISBN 978-80-8094-240-3; IVANIC, P., HETENYI, M.: *Christian Beginnings of the Western Slavs in the Context of the Interpretation of Historical and Archaeological Sources* (in Slovak). In: Persona y sociedad = Person and society. Toronto: University of Toronto, 2014, 306-334. ISBN 978-0-9878168-6-3.
[9] TERA, M.: *Perun God Thunderer. Probe into the Slavic Archaic Religion* (in Czech), Cerveny Kostelec: Pavel Mervart, 2009, 138. ISBN 978-80-86818-82-5.
[10] *Nestor´s Chronicle* (in Czech), Praha: Melantrich, 1940.
[11] DRSKA, V., PICKOVA, D.: *The History of Medieval Europe* (in Czech), Praha: Ales Skrivan, 2004. ISBN 80-86493-11-3.
[12] For more details see in e.g. LASSUS, J.: *Early Christian and Byzantine Art* (in Slovak), Bratislava: Pallas, 1971, 164-166. ISBN 94-088-71. AVENARIUS, A.: *Nikaia und Russland zur Zeit der tatarischen Bedhrohnung.* In: Byzantinoslavica, 40, 1980, 33-43. ISSN 0007-7712.
[13] FRIC, V.: The History of Cyrillic Manuscript Books in Ukraine (in Ukraine), Lvov: State University, 2003, 188. ISBN 966-613-279-6.
[14] DVORNIK, F.: *The Byzantine Mission by the Slavs* (in Czech), Praha: Vysehrad, 1970. See also in DVORNIK, F.: *Byzantine Political Ideas in Kievan Russia,* Dumbarton Oaks Papers, 9/10, Cambridge, 1956, 75-121.
[15] JANIN, V. L.: *The Medieval Novgorod in the Inscriptions on Birch Bark* (in Czech), Cerveny Kostelec: Pavel Mervart, 2007. ISBN: 978-80-86818-47-4.
[16] *MAGNAE Moraviae Fontes Historici III. Diplomata, Epistolae, Textus historici Varii*. Brno: Statni pedagogicke nakladatelstvi, 1969, 382-401.
[17] ZACHARTCHENKO, M. V.: *Pre-sociological Problems, Ideas, Teachings of Kievan Rus* (in Ukraine). In: Sociological thought in Ukraine, Kiev Naukova Dumka, 1996, 51. ISBN 5-7707-1076-4. SLAVIC Books of Cirillic Print in 15-18th Centuries. Kiev: Publishing House of the Academy of Sciences of the Ukrainian SSR 1958, 9.
[18] GORSKIJ, V. S.: The History of Ukrainian Philosophy (in Ukraine), Kiev: Naukova Dumka, 1996, 28. ISBN 966-00-0022-7.
[19] Handbook of History of Ukraine (in Ukrainen), Kiev: Geneza, 2002, 306-307, ISBN 966-504-179-7.
[20] VAVRINEK, V.: *The Introduction of the Slavonic liturgy and the Byzantine missionary policy.* In: Beitrage zur byzantinischen Geschichte in 9. - 11. Jhd., Praha: CSAV, 1978, 255-271.
[21] VAVRINEK, V.: Cyril and Methodius between Constantinople and Rome (in Czech), Praha: Vysehrad, 2013, 348-349. ISBN 978-80-7429-344-3.
[22] AVENARIUS, A.: *The Byzantine and Slavic Culture from the 6th to 12th century. To the Problem of Reception and Transformation* (in Slovak), Bratislava: Veda, 1992, 162-200. ISBN 80-224-0359-8.
[23] DANIS, M.: *Bulgarians; Kievan Rus* (in Slovak). In: Dejiny europskeho stredoveku I. Rany stredovek, Presov : Vyd. Michala Vaska, 2006, 198-199. ISBN 80-716-5576-7.
[24] MUCSKA, V.: *The Church and the Papacy in the Early Middle Ages (from 313 to the half of 11th Century* (in Slovak). In: Dejiny europskeho stredoveku I., Presov: Vyd. Michala Vaska, 2006, 319. ISBN 80-716-5576-7.
[25] See e.g. ZUBKO, P.: *The Development of Cyril-Methodius Texts in the Liturgy of the Hours in Central Europe* (in Slovak), *Konstantinove listy*, 8, 2015, 40-62. ISSN 1337-8740; ARSENIJ Archimandrit: *Veneration of Saints Cyril and Methodius in the Orthodox Church.* In: Konstantinove listy, 5, 2012, 19-28. ISSN 1337-8740; VALCO, M.: The Roots and Nature of Luther's Theological understanding of 'Missio Dei' in the Context of Reformation Agenda. *European J. of Science and Theology,* vol. 12, No. 4, 2016, 181-188. ISSN 1841-0464; KONDRLA, P., KRALIK, R.: *The Specifics of Mission of the Thessalonian Brothers and the Potential for their Actualization* (in Slovak), *Konstantinove listy*, vol. 9, No. 2, 2016. ISSN 1337-8740; SHYMKO, J. V.:

Church-Slavonic Language of the Late Period: Problems of Study and Description. *Konstantinove listy,* vol. 5, 2012, 63-72. ISSN 1337-8740; SKOVIERA, A.: *The Meeting of Eastern and Western Theology in a Songbook of J. Juhasevič from the year 1811* (in Slovak). In: *Slovenska, latinska a cirkevnoslovanska nabozenska tvorba 15. - 19. storocia,* Bratislava : Slavisticky ustav JS: SAV, 2002, 403-421. ISBN 80-967722-7-9. VALCO, M., KRALIK, R., BARRETT, L. Moral Implications of Augustine`s Philosophical and Spiritual Journey in his Confessions. In: *Communications - Scientific Letters of the University of Zilina*, No. 2, 2015, 103-108. ISSN 1335-4205.

[26] HURBANIC, M.: *The Byzantine Political Ideology from 9th to 12th Century* (in Slovak), Bratislava: Univerzita Komenskeho, 2003, 145. Dissertation thesis.

[27] PRIHODA, M.: *Cultural, Spiritual and Ethnic Roots of Russia: Tradition and Alternatives* (in Czech), Cerveny Kostelec: Pavel Mervart, 2005. ISBN 82-86818-15-2.

Jaroslav Coranic*

A CONCISE HISTORY OF THE GREEK CATHOLIC CHURCH IN SLOVAKIA FOLLOWING THE FALL OF THE COMMUNIST REGIME HISTORICAL AND SOCIAL EXCURSUS IN THE YEARS 1989 - 2002

The purpose of this paper is to present a concise historical and wider societal development of the Greek Catholic Church in Slovakia, or more precisely in Czechoslovakia, in the years 1989 - 2002. The Velvet revolution of 1989 triggered a collapse of the totalitarian regime in Czechoslovakia, bringing positive changes for the Greek Catholic Church, too. 40 years of the Greek Catholic Church persecution in Slovakia had come to an end and the Church could finally seize the opportunity to fully rehabilitate and develop their activities in all spheres of life. In the years 1989 - 2002, the Church was led by the seventh Greek Catholic Bishop of Presov Mons. Jan Hirka, during which time numerous renewal processes started to take effect in the Church's life.

Keywords: *History, Greek Catholic Church in Slovakia, Jan Hirka, Slovakia in the years 1989 - 2002.*

1. Introduction: The Dawn of a New Era

The very first positive and largely significant event for the Greek Catholic Church in Czechoslovakia after the fall of the communist regime [1] was the filling of an empty episcopal seat in Presov that been vacant since the death of Bishop Pavol Peter Gojdic in 1960. On 21 December 1989, one month after the events of November 17, the then Ordinary of the Greek Catholic Church, Mons. Jan Hirka, was appointed the seventh residential Bishop of Presov with an authority over the whole territory of Czechoslovakia (1989 - 2002) [2]. On February 17, 1990, Mons. Hirka received his episcopal consecration from His Eminence Mons. Jozef Cardinal Tomka, the Prefect of the Congregation for the Evangelization of Peoples. The other two co-consecrators were Bishop Michal Rusnak from Toronto and Bishop Slavomír Miklovs from the Croatian Eparchy of Krizevec. The ceremonial episcopal chirotonia (consecration) took place in the Town Sport Hall in Presov in the presence of bishops from all over the world, regional priests and the believers. Two archbishops and eleven bishops represented the Greek Catholic Church. Two Roman Catholic cardinals, one archbishop and five bishops from abroad were also present. Czechoslovak Episcopacy was represented by two archbishops and eight bishops [3]. The ceremonial enthronization of the new residential Greek Catholic Bishop Hirka was held at the Cathedral of St. John the Baptist in Presov on the following day, on Sunday, February 18, 1990 [4].

2. Bishop Hirka's Demands on Behalf of the Greek Catholic Church

Shortly after being appointed to his office, Jan Hirka had to face many challenges. The major challenge was to accomplish a full rehabilitation of the Greek Catholic Church. The most important task proved to be the return of the Greek Catholic episcopal residence (in the nation-wide restitution of property), numerous parish churches and the the Church's seminary and theological faculty. On December 12, 1989, prior to his appointment as a bishop, Jan Hirka formulated the demands of the Greek Catholic Church from the state published in the magazine *Slovo*. The demands were as follows:

- *"To declare the so called Sobor of 1950 null and void according to both ecclesiastical and state laws,*
- *to annul cadastral records based on the Ordinance No. 20285/51-II-I issued on February 13, 1952 by the former State Bureau for Church Affairs and to declare the Ordinance null and void,*
- to make a cadastral transfer of the cathedral and the bishop's residence, together with the adjacent buildings, namely the

* **Jaroslav Coranic**
Department of Historical Sciences, Greek-Catholic Theological Faculty, University of Presov in Presov, Slovakia
E-mail: jaroslav.coranic@unipo.sk

library, the archive and the shop Petra, to the Greek Catholic Church,
- to surrender the building of a former Greek Catholic orphanage and present-day Faculty of Orthodox Theology and establish the Faculty of Greek Catholic Theological and Priest Seminary there,
- to rehabilitate the late Bishop Pavol Gojdic and all those who were convicted,
- *to re-establish district deans in Kosice and Stara Lubovna (V. Skorodensky, or J. Soltys),*
- *to surrender the Greek Catholic monastic churches in Michalovce and Stropkov,*
- *to surrender monastic houses of male and female orders and restore them to the conditions before 1950,*
- *to permit monastic orders and a free (church) press,*
- *to obtain planning permission to build churches and parish buildings "where necessary",*
- *to surrender a parish building in Kosice and to establish a parish building in Bratislava,*
- *to close the deposit accounts for the sold church properties and pay them out to the Greek Catholic ecclesial community and to return the money that had been obtained,*
- *to agree with the demands of other Churches in the Czechoslovak Socialist Republic, namely to repeal the Act on state supervision over Churches and giving state consent to execution of pastoral activities,*
- *to create conditions for church activities in areas involving building churches, education, formation and studies of seminarians, lay associations and access to mass media"* [5].

Since 1990, the Greek Catholic Church has managed to retrieve its residence in Presov and almost all of its churches and parish buildings. Although these buildings were returned in rather poor condition, the enthusiasm, effort and devotion of the people and the clergy led by the Ordinary Jan Hirka greatly contributed to the reconstruction of all churches and parish buildings.

3. The Tedious Process of Reclaiming and Renewing the Church's Property

The Bishop's Residence

The return of the bishop's residence was a result of a process involving handing over the church properties from the Orthodox Christians to the Greek Catholics agreed upon by the representatives of the Slovak government, the Eastern Slovak Regional National Committee (KNV) in Kosice, the District National Committee (ONV) in Presov and the representatives of both Churches involved. The act of returning the bishop's residence to the hands of the Greek Catholics was rather "interesting". It began on April 10, 1990. The representatives of the Orthodox Church surrendered the residence to the Committee of State Administration led by the head of the Municipal National Committee (MsNV) in Presov PhDr. Ivan Benko. Late that day the Committee handed over the residence to the representatives of the Greek Catholic Church, namely to the Bishop's Office director PhDr. Pavol Dancak and the archivist Eugen Kocis [6]. Jan Chovanec, who was an editor of the independent weekly magazine *Slobodny piatok*, visited representatives of both Churches as well as Dr. Ivan Benko, the head of the Municipal National Committee (MsNV) and very realistically captured the atmosphere of those days as well as the whole process. In his article entitled *Disputes are bad medicine. On matters troubling believers of two Churches in one region (Nezhody sú zlý liek. O otázkach, ktoré trápia veriacich dvoch cirkví v jednom kraji*) he introduced an interreligious situation in East Slovakia half year after the Velvet revolution. Jan Chovanec commented on this process: *"The Greek Catholics had been without their property for forty years. No wonder they started to claim it back right away, in the first days of the Velvet revolution. But who would abandon what had been entrusted to them four decades ago without demur? And so, at first the date to surrender the residence kept being postponed until the intermediary – a committee headed by the head of the Municipal National Committee Ivan Benko was created* [7]." The Orthodox did not want to surrender this property, claiming that they had received it from the state and it is, therefore, the state only that must resolve this situation. Nikolaj, the Archbishop of Presov, the then highest representative of the Orthodox Church, refused the participation in the state-led transfer of the property from the Greek Catholics to the Orthodox. He commented on this matter as follows:

I was not yet a clergyman at that time but I know that we were not involved in the liquidation of the Greek Catholic Church. We were not pleased with what was happening then, but it was beyond our control. Nobody asked us whether we want it or not. Even their property was imposed upon us. Could the Roman Catholic Church have refused Pacem in terris? No. And neither could we have said that all was going to be as we wanted. They would have dealt with such daring people at once. Two of our metropolitans Jelevferij and Ján took early retirement for they did not agree with the state administration. The position was assumed by another metropolitan and he did as he was asked [7].

The Orthodox Church left the bishop's residence in a very poor condition. All rooms were empty for all the furniture had been taken away. All that was left were doorframes and door sills. The electrical installation and power distribution were destroyed, so were all sanitary facilities [7]. All power switches and light fittings were also removed. A valuable crystal chandelier lay on the floor in one of the rooms. When the editor of *Slobodny piatok* asked the Orthodox Archbishop to take his stand on this situation he replied: *"I came to the eparchy in 1965, so I cannot tell you where all the original possession is. The possession we took away belonged to us. Apart from that all that I removed was the Italian water faucet I had bought myself. One of our people took a boiler because it was his. One sink got broken. But the doors, doorsills,*

switches and light fittings were all there when I left the eparchy at 2 PM." When asked about the chandelier, Imrich Belejkanič, a director of Eparchial Council said: *"Our people were carrying away that big chandelier, but when we were told by the appointed person that the chandelier was theirs I ordered our people to return it."* The editor asked himself what had happened between 14:00 and 20:00 when the residence was officially taken over from the Committee of the MsNV by theGreek Catholic representatives. He further continued in his own reasoning, posing a rhetorical question: *"which new building* (note of an author: a new building of the Orthodox Bishop's Office) *would this chandelier be a good match for? Why bother dismantling it and damaging the fragile parts of a precious chandelier? ...People leaving this place perhaps did not even realize they were leaving something that did not belong to them. People coming back had tears in their eyes realizing that something was being returned back to them"* [7].

The Bishop's residence was not liveable in such condition. A complex reconstruction needed to be carried out. Specialist work was done by a construction company from Presov with the assistance of volunteers from the congregation of believers. The reconstruction process was completed mainly due to a financial support from several foreign foundations. The state contributed only partially [8].

The Faculty and Seminary Building

Even more intricate seemed the situation surrounding the Faculty and the Seminary. The Municipal National Committee in Presov started the process of dispossession of a building belonging to the Seminary and the Theological Academy, in favour of the town of Presov, as early as December 1949. However, the premises were still used for teaching and living purposes of the Greek Catholic seminarians until April 1950. In the following years, the building passed through the hands of several owners. For instance, it was owned by the national enterprise Krizik, Masokombinat (Meat processing plant) in Presov and the Czechoslovak Bus Company in Presov [9]. For some time, after its relocation from Prague, the original building of the Greek Catholic Seminary was a seat of the Faculty of Orthodox Theology [10]. The Faculty of Orthodox Theology was then moved again, to the building of the former Greek Catholic orphanage in Presov. The original historical building of the Seminary passed to the Directorate of Restauracie a jedálne (Restaurants and Diners) and in 1961 to the Faculty of Arts of the UPJS in Kosice with a seat in Presov [9 and 11]. At the beginning of the 1970s, the MsNV in Presov decided that it was "necessary" to erect a new building for the Jonsa Zaborsky Theatre. Based on that decision, the building of the Greek Catholic Seminary and Academy was demolished during the second half of the year 1973 and a first half of the year 1974. The construction works on the site of a new theatre commenced in June 1974.

On May 3, 1990, the Federal Assembly of the Czech and Slovak Federal Republic passed the Act No. 163 on Theological Faculties. In accordance with this Act, the Faculty of the Greek Catholic Theology was established (Art 1, § 1, sec. 4) and, at the same time, incorporated into the University of Pavol Jozef Safarik v Kosice (The University of Pavol Jozef Safarik comprised three faculties: Faculty of Medicine, Faculty of Natural Science, Faculty of Law /all three in Kosice/ and Faculty of Arts, Faculty of Pedagogy, The Greek Catholic Theological Faculty and the Orthodox Theological Faculty /all four in Presov/) [12]. Since the original building of the Theological Academy and the Priest Seminary had already been demolished, the Greek Catholic Church wanted to locate these institutions in the building of former orphanage, which was still used by the Orthodox Church. Therefore, the Greek Catholic Church demanded its swift return. However, that was not finalized until August 10, 1990.

The MsNV in Presov was trying to find a suitable object for the Faculty of the Orthodox Theology and Seminary and that caused some delays in the whole process. Some suitable objects were eventually found but they were still occupied by several Romany families. That was the reason for yet another delay since the town had to find some alternative accommodation for those families, too [7].

4. The Beginning of a New Theological Training

Doc. Vladimír Polacek was appointed the first dean of the Faculty of Greek Catholic Theology after its restoration and Vasil Kormanik was appointed the first rector of the Seminary. 43 seminarians were to be transferred to Presov from Bratislava where they had studied at the Faculty of Roman Catholic Theology of Cyril and Methodius [13]. However, the building of the Faculty and Seminary was returned in dire condition that required at least basic reconstruction. The new academic year could not commence on time since the necessary reconstruction works had to be carried out. Vasil Kormanik, the rector of the Seminary, assumed responsibility and reconstruction began with a substantial help of the seminarians. The Municipal Building Office in Presov carried out some specialized construction works [14].

The official opening of the academic year 1990/1991 was held on November 3, 1990 and was preceded by the holy liturgy at the Cathedral of St. John the Baptist in the presence of the Bishop of Presov Jan Hirka, the Apostolic Nuncio in the Czech and Slovak Federal Republic Giovanni Coppa, the Bishop of Kosice Alojz Tkac and the rector of Pavol Jozef Safarik University in Kosice prof. Rudolf Korec [13, p. 8].

Initially, the teaching was carried out in the premises of present-day Greek Catholic Seminary (former Greek Catholic orphanage). During the first academic year, the study was made accessible to lay men and women (as the first theological faculty in the territory of former Czechoslovakia; the theological faculties in Prague and Olomouc introduced this option in later years) [15].

The Faculty offered only one study programme - General Catholic Theology with the enrollment of 82 students in the first academic year [16]. In the second academic year, the Great Chancellor - the residential bishop Jan Hirka - provided the Faculty with additional premises in the Bishop's Palace. In that year, there were 141 students [17]. One year later, in the academic year 1992/1993 the faculty had 272 students [18], so the Bishop Hirka decided to provide additional rooms in another part of the Bishop's Palace which were until 1989 occupied by the Faculty of Pedagogy of Pavol Jozef Safarik University [19]. In the same academic year, the Dean's Office and all administrative, technical and economic departments of the faculty were moved to the same building. These premises have been a home to the Greek Catholic Theological Faculty of Presov University in Presov since.

The building of the new faculty was in urgent need of reconstruction which was finally carried out in 1993 - 1994 with a financial support of foreign sponsors mainly from Switzerland and Germany, since the financial contribution from the state towards the reconstruction of the (state) faculty was minimal [20]. This reconstruction provided new lecture and administrative rooms, hence allowing admission of more students. Five years after the reconstruction, in the academic year 1995/1996, the faculty had 550 students (130 seminarians and 420 lay students) in the study programme of the *General Catholic Theology – Teaching of Religion and Ethics* [21]. After the Faculty had moved, the building of the former Greek Catholic orphanage became fully available to the Greek Catholic Priest Seminary. As numbers of seminarians grew, the building no longer met the requirements of a modern seminary. For this reason, it was necessary to divide seminarians into two buildings. Some seminarians were accommodated on the premises of Bishop's Palace and the Faculty of the Greek Catholic Theology and the others in the orphanage building. A general reconstruction of the Seminary started in 1994 and it was completed on the 21st of November 1996 when the ceremonial consecration took place in the presence of the former Slovak president Michal Kovac. The Seminary bears the name of Blessed Bishop Pavol Peter Gojdic [22].

5. The Theological Faculty Becomes a Part of the University of Presov

On December 10, 1996, the National Council of the Slovak Republic passed the Act No. 361 on division of Pavol Jozef Safarik University in Kosice. Effective as of January 1, 1997, the University of Presov with a seat in Presov came into existence. The Greek Catholic Faculty was subsequently incorporated in the University of Presov. Similarly, the Greek Catholic Seminary became a special purpose facility of the newly established University of Presov [23]. In 2005 the Faculty of Greek Catholic Theology changed its name to the Greek Catholic Theological Faculty. The new name better expressed the mission of the faculty which is to provide education in the field of theology not only to candidates for priesthood (seminarians) but also to lay students [24]. The Greek Catholic Theological Faculty in Presov largely contributed to an increase of priests in the Greek Catholic Church after 1989. In 13 years of his bishop's service, Jan Hirka ordained 165 priests [25].

Some nurseries, elementary as well as secondary schools started to operate in the Presov Greek Catholic Eparchy after 1989. During the episcopacy of Ján Hirka several schools were established: St. George Elementary in Svidnik (September 1, 1992), the Church Nursery of Sister Josaphata in Lutina (September 1, 1999, founded by the Congregation of Sisters Servants of the Immaculate Virgin Mary), Secondary Medical School of St. Basil the Great in Presov (September 1, 1990, founded by the Congregation of Sisters of St. Basil the Great) and the Grammar School of St. John Chrysostom in Humenne (September 1, 1998).

6. The Story of the Church Archive

Also located in the building of the Greek Catholic Bishop's Office was the Bishop's Archive. After 1950, the Bishop's Archive, like all other Greek Catholic institutions, was transferred under the jurisdiction and later ownership of the Orthodox Church.

In 1956, after the agreement between the state and the church institutions had come into effect, the state authorities took over the administration of the Archive. As of March 31, 1956, the Regional Administration of the Ministry of Inferior Affairs in Presov took over the Archive of the former Greek Catholic eparchy and a part of the Seminary Archive (the Seminary had its own archive) [26]. The Archive was under the administration of the state during the years 1956 - 1993, during which time its resources were incorporated into the State District Archive in Presov. The archival materials of the ecclesiastical archive were stored in the original building of the former Presov Greek Catholic Bishop's Palace until the end of the 1950s. At the beginning of the 1960s, the archive was gradually moved to the building of the State District Archive in Presov (district of Nizna Sebastova). In 1993, the resources of the Greek Catholic Bishop's Archive were excluded from the State District Archive and then returned to the Greek Catholic Church [27].

7. The Appointments of Church Dignitaries Following the Year 1992

The Presov Greek Catholic Eparchy extended over the whole territory of Czechoslovakia. Its administration over such a vast territory brought about many difficulties. For that reason, the Holy See appointed Mons. Milan Chautur, CSsR (the then vice-provincial of the Congregation of the Most Holy Redeemer in

Slovakia) an auxiliary bishop. He assumed his office on January 11, 1992.

At the age of 34, a titular bishop of Cresima, Mons. Milan Chautur became the youngest Catholic bishop in Czechoslovakia. On February 29, 1992, Milan Chautur received his episcopal consecration from the residential Bishop of Presov Mons. Jan Hirka. The co-consecrators were Bishop Michal Rusnak, CSsR from the St. Cyril and Methodius Eparchy in Toronto and the then Apostolic Nuncio in the Czech and Slovak Federal Republic titular bishop of Serta Mons. Giovanni Coppa [28]. The episcopal consecration was again held in the Town Sport Hall in Presov and was attended by many clergy and believers. On the following Sunday, March 1, 1992, Mons. Michal Chautur was initiated into his office in the Church of Father's Redemptorists in Michalovce. Mons. Milan Chautur worked in Presov for almost five years, assisting the residential bishop Ján Hirka in his pastoral ministry to the believers [29].

8. The Papal Visit of 1995 and the Beatification Processes

The greatest event in the history of the Presov Greek Catholic Eparchy was the papal visit of John Paul II on July 2, 1995. John Paul II arrived to Presov from Kosice and his first stop was at the Cathedral of St. John the Baptist just before 5 PM. He first prayed there in front of the open royal doors of iconostasis. Then, in the company of the Bishop of Presov Mons. Jan Hirka, the Pope John Paul II entered the Chapel of St. Peter and Paul and prayed at the tomb containing the remains of now beatified Bishop Pavol Peter Gojdic, OSBM. The highlight of the papal visit to Presov was his meeting with around 200.000 believers who, together with the Pope, prayed Akathist to the Most Holy Lady Mother of God. In his address to the gathered crowd, John Paul II recognized the heroism of the Greek Catholic Church, emphasizing its value, beauty and profoundness. He stressed that the presence of the Greek Catholic Church is a telling testimony of how to be, despite all difficulties, faithful to an original model created by Cyril and Methodius. He spoke of a model created in order to combine diversity of traditions with the need of unity that Christ wanted for his Church. In his address, the Holy Father compared the communities of Eastern Rite Catholics to the small Tatra lakes - tarns [30].

The episcopacy of Jan Hirka was marked by several very important events. First, the beatification process of Bishop Pavol Peter Gojdic OSBM was successfully completed and secondly, the beatification process of Bishop ThDr. Vasil Hopko continued without interruption. The process of beatification of Bishops of Presov Pavol Peter Gojdic and Vasil Hopko and the Bishop of Mukachevo, Teodor Romza, had already started in the Greek Catholic Archeparchy of Pittsburgh, USA in 1986. On May 27, 1986, the Congregation for the Causes of the Saints sent a decree to Mons. Stefan Kocisko (the then Greek Catholic Archbishop in Pittsburgh). The Congregation approved the preparation of beatification processes of bishops Teodor Romza, Pavol Peter Gojdic and Vasil Hopko in Pittsburgh archeparchy, USA. However, the cause could not be officially opened due to the totalitarian regime in Czechoslovakia. Many important sources and materials needed for the process, as well as the most witnesses were in the country [31].

Eight years later, on 17 December 1994, the Congregation for the Causes of Saints granted Nihil obstat to the case of Pavol Peter Gojdic and Vasil Hopko [32]. It was the Pope John Paul II who indirectly gave an impulse to continuation, or initiation of the beatification processes at the level of Presov Greek Catholic Eparchy. During his official visit to Presov in 1995 he said:

We all remember the dramatic situation in the recent past, when the powers of ideology which are so contrary to human freedom and dignity condemned your religious community to extinction. God, however, removed the mighty from the throne and elevated those who had been humiliated (Luke 1, 52) for they were sympathetic to each other in their love for Christ...The Greek Catholic Church community came out of this trial renewed and strengthened also thanks to the testimony and the blood of many martyrs. The faith of a large number of lay persons, monks, nuns, priests and spiritual pastors is a living testimony of that. Just remember the suffering of Bishop Vasil Hopko and the martyrdom of Bishop Pavol Gojdic. On the brink of the third millennium it is a valuable contribution that your community brings in favour of ecumenism [33].

The Pope remembered the martyrdom of Bishops Pavol Peter Gojdic, OSBM and Jan Vojtassak again during his homily in Marianska Hora in Levoca when he said the following: *"Both were imprisoned on the basis of pseudo-trials. Today they deserve the beatification process because they gave a great testimony to a loyal service of Church in Slovakia"* [34].

On October 19, 1995, the Secretary of the Congregation for the Causes of Saints Archbishop Edward Nowak addressed a decree to Bishop of Presov Jan Hirka informing him that the Greek Catholic Eparchy in Presov should continue in the cause of beatification of bishops P. Gojdic and V. Hopko. The decree stated: "*since the political situation in Slovakia has changed, the preparation of beatification process must take place in the diocese where Bishops Gojdic and Hopko had died, that is in the Eparchy of Presov. It should be done in accordance with the Canon Law and as requested by His Excellency Metropolitan - Archbishop of the Byzantine Catholic Church Judson Michael Procyk, successor to His Exc. Archbishop Stefan Kocisko"* [31, p. 78].

The diocesan (eparchial) stage of the beatification process of Father Bishop Pavol Gojdic, OSMB was officially initiated in the Chapel of the Bishop's residence in Presov on 17 July 1998, the 110th anniversary of his birth [35]. The diocesan stage of the beatification process of Father Bishop Vasil Hopko was initiated on January 30, 2001. There were three commissions appointed to prepare the diocesan stage of the beatification process: the Law

Commission, the Commission of Experts in Historical Matters and in Matters that pertain to Archives, and the Commission of Theological Censors. The diocesan stages were successfully completed on March 24, 2001 when the final meetings took place. The Congregation for the Causes of Saints verified both causes and confirmed the legal validity of the diocesan stages in April 2001 [36]. The stage in which Roman Congregation of Rites decides was opened for both causes on May 4, 2001. After an examination and an affirmative vote of the Congregation for the Causes of Saints, the Pope John Paul II issued two decrees, one on September 28, 2001 and the other on July 7, 2003, in which he confirmed the martyrdom of P. P. Gojdic and Vasil Hopko [31, p. 85, 88].

The whole process was completed by ceremonial beatifications. Bishop Pavol Peter Gojdic, OSBM was declared blessed by the Pope John Paul II in St. Peter's Square in Rome on November 4, 2001, together with the Redemptorist priest Metod Dominik Trcka, CSsR [37]. The beatification of Vasil Hopko and Sister Zdenka Schelingova was held on September 14, 2003 in Bratislava - Petrzalka during the third official visit of John Paul II to Slovakia [38].

Not long after both beatifications, the relics of both bishops were transferred to the Cathedral of St. John the Baptist in Presov. The bodily relics of Bishop Pavol Gojdic, OSBM were transferred on November 17, 2001 [39]. The holy liturgy of thanks was celebrated by the Bishop of Presov Mons. Jan Hirka in the Town Sport Hall in Presov. The Apostolic Nuncio in Slovakia, Archbishop Henryk Jozef Nowacki, was also present. The remains were then carried accross the whole town in the presence of many clergy and believers and placed into a sarcophagus in the Chapel of the Holy Cross in the Cathedral of St. John the Baptist [40]. The ceremonial transfer of Bishop Vasil Hopko's relics took place on September 20, 2003. The liturgy was celebrated by the Prefect of the Congregation for the Oriental Churches, Patriarch Emeritus Ignatius Moses I, Cardinal Daoud from Rome [41].

9. Bishop Hirka's Recognition

The Bishop of Presov Mons. Jn Hirka was recognized for his lifetime of work, administering the Greek Catholic Church in Czechoslovakia and Slovakia by both church and state authorities. The Pope Paul VI acknowledged Hirka's activities by granting him the title of 'Honorary Prelate' on March 21, 1978. On December 16, 1998, the Scientific Board of the University of Presov, following the proposal of the Scientific Board of the Faculty of Greek Catholic Theology, awarded Jan Hirka the honorary degree *"Doctor honoris causa"* [42]. In 1999, on the occasion of Hirka's 75th birthday, the president of the Slovak Republic awarded him the Order of Andrej Hlinka, 1st class and with the Order of Pribina, 2nd class in 2003. The president did so based on the proposal of the Slovak government. In 2006 Hirka became a laureate of Presov Self-governing region and in 2008 he was awarded Jozef Skultety Prize by Matica slovenska [43].

On December 11, 2002, the Pope John Paul II accepted a resignation presented by the Greek Catholic Bishop of Presov Mons. Jnn Hirka, in accordance with canon 210 of CCEO (Code of Canons of the Eastern Churches) and on the same day appointed a new Bishop ThDr. Jan Babjak SJ, PhD. Jan Hirka became Bishop Emeritus. For the short time following the retirement of Jan Hirka, the Presov Eparchy was managed by the general vicar of the eparchy Jan Zavacky, appointed by the Congregation of Consultors on December 16, 2002. In accordance with canon 229 of CCEO he had the same rights and duties as eparchial bishop and he administered the eparchy until ThDr. Jan Babjak SJ, PhD. was consecrated a new residential Bishop of Presov on January 6, 2003 [44].

References

[1] Though the communist totality ended in 1989, its consequences are still felt today. "Central and Eastern European societies have had a direct experience with ... the atheistic materialism of Communist ideology - with grave socio-political, economic, and especially moral consequences." VALCO, M. - VALCOVA, K.: The Epistemological Challenge of Kierkegaard's Truth is Subjectivity Principle, *Communications : Scientific Letters of the University of Zilina,* vol. 16, No. 3, 2014, p. 27.

[2] Peace and Mercy under the Protection of Mary (in Slovak), *Slovo*, vol. 22, 1990, No. 3, p. 1.

[3] The Day of Revival Has Dawned (in Slovak), *Slovo*, vol. 22, 1990, No. 5, p. 4.

[4] Chronicle of Father Bishop *(in Slovak), Slovo*, vol. 22, 1990, No. 5, p. 15.

[5] HIRKA, J.: The Demands of the Greek Catholic Church (in Slovak), *Slovo*, vol. 22, 1990, No. 3, p. 3-4.

[6] After 40 Years Back Home Again (in Slovak)), *Slovo*, vol. 22, 1990, No. 6, p. 14.

[7] CHOVANEC, J.: Disputes are bad medicine. On matters troubling believers of two Churches in one region (in Slovak), *Slobodný piatok*, 25 May 1990, p. 4.

[8] HIRKA, J.: *Under the Protection of Mary. A Sheperd in Service of the Church* (in Slovak). Presov : GTF PU, 2013, p. 208.

[9] LACA, P.: *History of the Priest Seminary in Presov* (in Slovak), Presov : GTF PU, 2009, p. 55.

[10] MAREK, P., BUREHA, V.: *The Orthodox in Czechoslovakia in 1918 - 1953* (in Czech), Brno : CDK, 2008, p. 421.
[11] TEAM OF AUTHORS: *Register of Monuments in Slovakia, part 2, K – P* (in Slovak), Bratislava : Obzor, 1968, p. 558.
[12] STURAK, P.: *Historical Outline of Theological Education in Greek Catholic Church in Slovakia* (in Slovak), in J. Coranič (ed.): *The Church in the History of Christianity in Slovakia* (in Slovak), Presov : GTF PU, 2014, p. 17.
[13] DANCAK, F.: *The Faculty of Greek Catholic Theology opened in Presov* (in Slovak), *Slovo*, vol. 23, 1991, No. 1, p. 9.
[14] KORMANIK, V.: *A Brief Look at the History of Seminary* (in Slovak), in *125. Academia teologica: "Heritage and the future",* Presov : Petra, No., 2006, p. 21.
[15] POLACEK, V.: *Mission of the Faculty* (in Slovak), *Univerzita Pavla Jozefa Safarika v Kosiciach 1990 - 1991. Study programme, general section, Faculty of Greek Catholic Theology*, Kosice : 1990, p. 1.
[16] *Report of Higher Education Institution* (in Slovak), data as of 31.10.1990, Archive of the Study deprtment of the Greek Catholic Theological Faculty, University of Presov in Presov.
[17] *Report of Higher Education Institution* (in Slovak), data as of 31.10.1991), Archive of the Study department of the Greek Catholic Theological Faculty, University of Presov in Presov.
[18] *Report of Higher Education Institution*, data as of 31.10.1992 (in Slovak), Archive of the Study department of the Greek Catholic Theological Faculty, University of Presov in Presov).
[19] LIPTAK, R.: *88 years of Catholic Theology Study in Presov* (in Slovak), History of the Greek Catholic Education in Slovakia II, Presov : 2009, p. 112.
[20] POLACEK, V.: *Introduction* (in Slovak), Study programme, Faculty of Greek Catholic Theology P. J. Safarika 1993-1994, Kosice : UPJS, 1993, p. 3.
[21] JANHUBA, F.: *Introduction* (in Slovak), Study programme, Faculty of Greek Catholic Theology P. J. Safarika 1996-1997, Presov, 1996, p. 6.
[22] SIMKO, M.: *History of the Greek Catholic Priest Seminary of Blessed Pavol Peter Gojdic in Presov* (in Slovak), History of the Greek Catholic Education in Slovakia II, Presov, 2009, p. 158.
[23] MATLOVIC, R.: *15 years of the Presov University in Presov*), Presovska univerzita v Presove, Presov : Vydavatelstvo PU, 2012, p. 9.
[24] Amendment No. 1 to the Statute of the Faculty of Greek Catholic Theology, University of Presov in Presov (in Slovak), Resolution No. 33 of Academic Senate of the Faculty of Greek Catholic Theology, University of Presov in Presov); http://www.unipo.sk/public/media/1502/Vypisy%20uzneseni%20 AS%20GTF%202003-2007.pdf.
[25] RUSNAK, A.: In Episcopal Service. 18th Anniversary of Episcopal Consecration of Mons. Jan Hirka (in Slovak), *Slovo*, vol. 40, No. 7, 2008, p. 8.
[26] HRIVNAK, S.: *Greek Catholic Eparchy in Presov 1323 - 1821 - 1950* (in Slovak), State District Archive, Presov, 1968, No. 2.
[27] CORANIC, J.: *Archive of the Greek Catholic Eparchy in Presov* (in Slovak), *Archiva ecclesiastica 5: biuletyn stowarzyszenia archiwistow koscielnych,* Katowice : Ksiegarnia sw. Jacka, 2012, pp. 10-11.
[28] *Bishop Milan Chautur, C.SS.R. Bishop of Kosice*, in http://www.catholic-hierarchy.org/bishop/ bchautur.html.
[29] HOSPODAR, M.: *Vladyka Milan Chautur CSsR, the first Greek Catholic Eparch from Kosice* (in Slovak), *Slovo*, vol. 40, No. 5-6, 2008, p. 14.
[30] PETRIK, L.: *10th Anniversary of the Papal Visit to Presov* (in Slovak), Greek Catholic Calendar 2005, Kosice : Byzant s.r.o., 2004, p. 32-34.
[31] KREHLIK, J.: *History and chronology of the beatification process of the blessed bishop – martyr ThDr. Vasil Hopko, Midilsky Titular Bishop and Auxiliary Bishop of the Bishop of Presov* (in Slovak), in V. Bohac (ed.): The Reflection of unity in the work and life of the blessed bishop Vasil Hopko *(1904-1976) in the context of the European integration process* (in Slovak), Presov : GTF PU, 2010, pp. 77-78.
[32] STURAK, P.: *Pavol Peter Gojdic OSBM, the Greek Catholic Bishop of Presov (1926 - 1960)* - (in Slovak), Presov : GTF PU, 2013, p. 92.
[33] *Address of John Paul II to the Greek Catholic believers in Presov on 2 July 1995 (in Slovak)*, Greek Catholic Calendar 1996), Michalovce : Byzant, 1995, p. 36.
[34] KOSIAR, J., LABO, S., VRAGAS, S.: *Apostle of the Nations of the 20th Century* (in Slovak), Second visit of John Paul II to Slovakia, Trnava : Dobra kniha, 1995, p. 137.
[35] STURAK, P.: *The Beatification Process of Bishop P. P. Gojdic* (in Slovak), in R. Letz (ed.): *They were Three. 50 years Since the Political Trial with Slovak Catholic Bishops* (in Slovak), Bratislava, 2001, p 137.
[36] KREHLIK, J.: The Gojdic Case: About the Process of Beatification of Vladyka Pavol Peter Gojdic (in Slovak), *Slovo*, vol. 38, No. 23, 12. 11. 2006, pp. 8-9.
[37] *Pavol Peter Gojdic* (in Slovak), A commemoration published for the event of his beatification on November 4, 2001, Presov, 2001.

[38] *Blessed Bishop Vasil Hopko, Biography, Prayers, thoughts* (in Slovak), Published by the Greek Catholic Eparchy in Presov on occasion of beatification of Vasil Hopko on 14 September 2003 in Bratislava, Presov, 2003.
[39] PRIBULA, M.: Ceremonial Transfer of Relics (in Slovak), *Slovo,* vol. 33, Presov, January 2002, p. 7.
[40] KOSUTOVA, A.: The Relics of Bishop Gojdic will be Transferred and Laid in the Chapel on Saturday (in Slovak), *Korzar*, 14, 11. 2001, http://korzar.sme.sk/c/4677802/v-sobotu-slavnostne-prenesu-relikvie-biskupa-gojdica-a-ulozenia-ich-do-kaplnky.html.
[41] PETRIK, L: *History of the Cathedral of St. John the Baptist and the Bishop's Residence in Presov* (in Slovak), Presov : Petra, 2007, p. 98.
[42] STURAK, P., PALA, G., CORANIC, J. (eds.): *Messengers of Faith, Wisdom and Knowledge,* Presov : GTF PU, 2010, pp. 23-35.
[43] PETRO, M., STURAK, P.: *The Greek Catholic Church in Slovakia, part 1* (in Slovak), *Heritage of St. Cyril and Methodius,* Presov : Petra, 2012, p. 164.
[44] *Interim Administrator to Presov Eparchy (in Slovak)*, in http://grkatpo.sk/?spravy&id=265.

Hans Peter Beck - Ivan Melo - Thomas Naumann*

SOME ETHICAL QUESTIONS IN PARTICLE PHYSICS

Authors will discuss a few ethical questions in today's particle physics: high costs and purported dangers of Big Science projects, relevance of fundamental research for society and the way particle physicists fill their duty to communicate with the public. Examples will be given including the story of a possible mini-black hole creation at CERN and two outreach activities for high school students, International Particle Physics Masterclasses and Cascade competition.

Keywords: *Particle physics, Big Science projects, communication, outreach, role of science in society.*

1. Introduction

Nowadays we are witnesses of increasing distrust of governments and political system in society. Some groups question democracy itself. To make things worse, it appears that science is not an exception and a growing number of people look upon it either with suspicion or find it less and less relevant for their lives. As a result, many fill the empty space with cheap substitutes and fall prey to conspiracy theories, superstition and dubious alternative healing methods, to name just a few.

When looking for reasons within science domain, we find that there is an objective barrier between complex language and methods used by modern science on the one side and the public on the other side which requires more and more effort to get through. For us scientists it can be a grueling task among all our research obligations. Nevertheless, the questions, suspicion, doubts and fears we face are understandable and it is our duty to address them in an honest way. In fact, communicating our results to the public and sharing the beauty of our discoveries with the young generation should be considered an intrinsic part of research work within the scientific community. In this contribution we will describe how particle physicists deal with some of these ethical issues.

2. Demystifying the Universe

Particle physics probes the basic building blocks of matter and their interactions, which determine the structure and properties of the extreme diversity of matter in the universe. It aims at explaining what holds the world together in its most fundamental constituents.

Modern physics relies on an elegant «Standard Model of particle physics», a quantum field theory based on three symmetries and a symmetry breaking. This theory describes and explains magnificently all experimental results obtained so far. With the discovery of the Higgs particle in 2012 at the Large Hadron Collider at CERN, the last missing piece of the Standard Model has been experimentally confirmed. Experiments at CERN and at other international laboratories now continue to test the validity and limits of the Standard Model in ever widening scope. However, for a comprehensive understanding of the laws of nature a theory beyond the Standard Model is needed, which should include gravity and explain the presence of dark matter and dark energy in the universe.

The quest for deeper and deeper understanding is therefore pushed in all thinkable and affordable manners at laboratories and universities worldwide. With the scale, complexity and costs of modern experiments ever increasing, physicists have learned that only when concentrating in international, large-scale collaborations, involving thousands of physicists from hundreds of institutions, from many tens of countries and all continents worldwide, ground-breaking advancements can be achieved. Examples are the above-mentioned discovery of the Higgs boson at CERN by the A Toroidal LHC ApparatuS (ATLAS) and Compact Myon Solenoid Spectrometer (CMS) Collaborations in 2012 [1 and 2], the detection of gravitational waves by the Laser Interferometer Gravitational-Wave Observatory (LIGO) Collaboration in the US [3], the detection of the highest energies of cosmic ray particles by the Icecube Collaboration at the South pole in 2015 [4], the new upper limits on Darkmatter

* [1]Hans Peter Beck, [2]Ivan Melo, [3]Thomas Naumann
[1]Albert Einstein Center for Fundamental Physics, Laboratory for High Energy Physics, University of Bern, Switzerland
[2]Department of Physics, Faculty of Electrical Engineering, University of Zilina, Slovakia
[3]Deutsches Elektronen-Synchrotron DESY, Zeuthen, Germany
E-mail: hans.peter.beck@cern.ch

candidates by the Large Underground Xenon experiment (LUX) Collaboration in 2016 [5], to name just a few.

As a reaction to such fundamental large-scale experiments, which often make head-lines in the public press, questions arise on the usefulness of fundamental research, whether money should better be spent otherwise, e.g. to cure world hunger, or to invest in cancer research instead. Often fears and potential dangers from such experiments are expressed along-side such critics. Applications based on new knowledge gained from fundamental research may not only be used for the better of mankind, but can indeed be life threatening, which, as often is argued, should be reason enough for not pursuing fundamental research any more. Further, some people may question whether mankind should even address scientifically a deeper understanding of the Universe, its coming to existence, evolution and possible fate.

Only when addressing openly these questions, emphasizing the relevance of fundamental research, its benefits to society and mankind worldwide, by leading an open dialogue, such perceived fears can be recognized as irrational or at least be lingered. Furthermore, the costs can be explained, put in relation with other state expenses, and be recognized as dwindling when compared with medical, educational, or infrastructure costs, and be understood as well placed investments for a flourishing future.

On the costs of Big Science projects:

It is true that e.g. building the Large Hadron Collider at CERN and the associated experiments, ALICE, ATLAS, CMS, and LHCb, meant an investment in the order of 10 billion Euros. A cost factor that at first sight seems extremely high, when not be put in relation. The overall project of the LHC has a life-span of the order of four decades, from the initial ideas, the research and development phase on how to build the accelerator and the experiments, their construction and commissioning, it already took two decades [6]. Adding the data-taking, the detector and machine upgrades, and the data analysis time scales to this, which takes another two decades, explains the long time span of such projects, during which generations of young people get trained and are working at the forefront of knowledge in a demanding truly international environment. Further, the overall funding is shared among the CERN 21 member states and additional 43 countries directly contributing to the experiments at CERN. The costs have therefore to be understood as split over many countries and over four decades. The overall cost-sharing scheme is further taking into account the economic strength of each participating member, such that rich and poor countries can equally participate and contribute. Indeed, physicists do not receive more funding for their research than scientists in other areas of research. Physicists however manage to concentrate resources to big common goals and structure their research worldwide in a coordinated effort. Costs are therefore being minimized and unnecessary parallelism otherwise occurring in many competing small-scale research teams is avoided.

Fundamental research has led to many applications, now being thought of as given in modern society. Prominent examples come from medical diagnostics and cures. Many scanning and imaging devices find their roots in particle detector technologies, also radiotherapy, hadron therapy, or even the production of special isotopes would not be thinkable without accelerator technologies – this forms a direct answer regarding the use of money in cancer treatment. Indeed, particle physics provides new tools and methods for medical treatment of cancer and more.

Many of the everyday materials, such as e.g. ordinary shrink-wrap used for packing food before placing it in an ordinary refrigerator, car tyres, cable isolations, etc., etc. need to undergo special treatment to obtain their needed structures, hardness, or softness depending on specific requirements and use cases. Such special treatment means that materials undergo radiation with electrons and sometimes also other particles accelerated using particle accelerators. Indeed, many tens of thousands of particle accelerators are operating almost unnoticed continuously for industrial purposes worldwide, whereas only a handful of pure research accelerators exist in the world. With better food storage, and in general with better materials available, an important contribution to world hunger is made. Sure in cases of urgent needs such as draughts, wars, and other catastrophes, resources must be made available for immediate help. For creating longer-term improvements of the overall situation, new applications and spin-offs from fundamental research activities will provide tools and methods to linger and help.

On applications based on new knowledge gained from fundamental research that may not only be used for the better of mankind:

Fundamental science and gaining new insights in the understanding of the Universe is *per se* free from qualifying it as good or bad. Knowledge and understanding in general can however be used in different ways, and here, a deep ethical question arises that needs broad discussion in society. Such questions, however, are not new to mankind, but are part of its entire history. This started probably when first tools were created and is nicely shown e.g. with the mastering of fire in prehistoric times. Indeed, fire can be used to warm up sheltering places, to prepare food, to treat materials and can also be misused to do harm to others. Nowadays, threats from misuse of applications can have global dimensions. With e.g. the construction of atomic bombs, that were only possible when applying new knowledge from fundamental research, a worldwide threat was created that clearly showcases where limits need to be set in the building and construction of applications – but not in the quest of fundamental research itself. We may miss new insights in the understanding of the Universe as a whole, and will prevent new applications in the benefit of society.

On whether mankind should even address scientifically a deeper understanding of the Universe:

Asking deep questions is paramount to mankind. It is part of humanity to try to know where we are coming from, what our world constitutes of, what the future will be, why the sky is blue, or why the grass is green. With a lack of understanding, and with a lack of tools and methods to address such deep questions, superstition and bad answers prevail in order to satisfy, and therefore also muzzle, curiosity. Without curiosity, however, no advances in society are possible. This may be seen as non-problematic, and indeed is seen as best solution in some societies. Indeed, inside small, isolated groups such a scheme can work well. On a global scale, however, only a global understanding of the world, and not superstition, can lead to societies that collaborate and are addressing global issues together.

Fundamental research activities, with their large-scale projects, are showcasing that common, complex goals can indeed be addressed across national, ethical, or religious boundaries, and showcasing a pathway leading to open societies that freely interact without borders.

3. Mini Black Holes, Apocalypse and CERN's honest response

The history of black holes at the European Centre of Nuclear Physics CERN in Geneva shows how particle physics reacted to the fears of the public initiated by a discussion on a possible universal doomsday in the media in an honest and transparent way. The starting point was the fact that the Large Hadron Collider LHC at CERN amongst many other topics seeks after microscopic black holes. They are predicted by some theories of quantum gravity to be possibly produced at the high energy densities reached in the particle collisions at the LHC and to decay immediately due to Hawking radiation predicted in the same context.

In the years before the commissioning of the LHC the worry came up in parts of the public and among interested laymen that microscopic black holes similar to massive macroscopic black holes could attract matter, swallow our Earth and finally the whole Universe. So in February 2008 a threatening simulation appeared on YouTube [7] in which a black hole created at CERN swallows the Earth. The video immediately found millions of watchers (more than 5 million till 2014) and was also shown in television. Concerned laymen in the United States and Switzerland raised lawsuits against CERN because of destruction of the whole world and tried to get the commissioning of the LHC prohibited by a court.

As a reaction to this accuse CERN before the LHC start-up in 2008 called its "LHC Safety Assessment Group" which updated an existing safety study [8] from 2003. CERN developed a clear chain of arguments:

- The energies of cosmic rays are billion times higher than the LHC energy.
- Nature performed at least one million LHC experiments with Earth.
- The Universe in total does a billion LHC experiments per second.

Nevertheless stars collapsed to black holes do not dominate the Universe. From this the CERN study clearly concluded: The LHC is safe [9]. CERN started a further campaign [10] in May 2009 at the premiere of the film „Illuminati" produced after Dan Brown´s novel which partially takes place at CERN.

Also in Germany, a lawsuit was filed before the Federal Constitutional Court. Fortunately, the court dismissed it arguing that the applicant could not demonstrate conclusively why the Earth was threatened with destruction [11]. The judges declared in their verdict that basic research cannot be stopped just because some individuals do not believe in the established laws of physics.

This judgment was greeted in the press with much humour and relief:

"Who is afraid of a Black Hole? Karlsruhe rejects doomsday lawsuit", the "Spiegel" [12] joked. The Frankfurter Allgemeine Zeitung on its title page commented the judgment of the court with two small black holes and the remark:

"Apocalypse ad acta".

Outside Germany the *German Angst* [13] was ridiculed:

"Une Allemande craignant la fin du monde échoue à paralyser le CERN".

However, on the day of the LHC start-up the Frankfurter Allgemeine presented on its title page a gigantic black hole with the question:

"Do we disappear in a Black Hole?" and the moderator of the second German TV said good-bye forever to its viewers. On the day of the first LHC collisions the "FOCUS" [14] asked:

"Doomsday now?", and "Die Welt" stated with relief [15]:

"Big Bang experiment without Doomsday".

The online edition of the "Scientific American" announced the fifth anniversary of the LHC start-up in September 2013 with the headline:

"LHC celebrates 5 years of not destroying the world" [16].

So thanks to an open and professional reaction to the fears of the public CERN and the world-wide LHC communication could avoid a severe damage both to its research and to its reputation.

However, a few years later doomsday fears reappeared. In a brilliant popular article on the inflationary universe the Russian-American cosmologist Andrei Linde in 1994 had developed the idea how to initiate from a tiny amount of extremely dense matter an eternally self-reproducing inflationary universe:

"Instead of watching the universe at the screen of a computer, one may try to create the universe in a laboratory. Such a notion is highly speculative, to say the least. But some people (including Alan H. Guth and me) do not want to discard this possibility completely out of hand. One would have to compress some matter in such a way as

to allow quantum fluctuations to trigger inflation. Simple estimates in the context of the chaotic inflation scenario suggest that less than one milligram of matter may initiate an eternal, self-reproducing universe. We still do not know whether this process is possible"[17].

Linde finally asked: *"Is it conceivable that our own universe was created by a physicist-hacker?"*

Linde did not discuss how far the possibility of such a phase transition endangers the existence of our Universe. This left room for deep fears. The nuclear age also began with an estimation of the energy released from nuclear fission by Lise Meitner and her nephew Otto Frisch.

Based on such scenarios and by a statement by Stephen Hawking in September 2014 worries spread in the media that the Higgs boson could cause the end of the Universe [18]: *"Stephen Hawking Believes Higgs Boson Particle May Destroy Universe".* The "Berliner Kurier" reported [19]:

"Stephen Hawking: Stay away from God particle ... it could trigger the doomsday", and "Focus Online" warned [20]:

"Hawking warns of space-time collapse:

God Particle could destroy the Universe".

Now, the US-American particle physics reacted properly and published a rectification in its online magazine "symmetry" [21]: "If you're a science enthusiast, this week you have likely encountered headlines claiming that physicist Stephen Hawking thinks the Higgs boson will cause the end of the universe. This is a jaw-dropping misrepresentation of science. The universe is safe and will be for a very long time - for trillions of years. To understand how abominably Hawking's words have been twisted, first we need to understand his statement". Having clarified the facts it concludes: "Returning to the original, overly hyped media stories, you can see that there was a kernel of truth and a barrel full of hysteria..."

4. International Particle Physics Masterclasses

This event for high school students is a good example of care and zeal which particle physicists put into bringing the excitement of cutting-edge particle physics research into classrooms. Particle Physics Masterclasses [22] started in Great Britain in 1996 and turned international in 2005 under the coordination of International Particle Physics Outreach Group [23]. It became a very popular activity for students who come each year in the spring to nearby universities or research centers to become "scientists for a day" [24]. Masterclasses is a truly global undertaking. In 2016, more than 10 000 students in 47 countries took part in the event at one of 200 universities (Fig. 1) over 5 weeks.

The format of the day includes three key elements:

i) lectures from active scientists give insight on topics and methods of fundamental research on the building blocks of matter and the forces between them, ii) active participation of students in measurements on real data from LHC experiments ALICE, ATLAS and CMS and iii) international video-conference moderated from CERN or Fermilab during which students compare and combine results with their peers in other countries and discuss physics with the moderators. The main purpose of Masterclasses is to expose students to the scientific process and share our excitement about physics with them.

Fig. 1 Masterclass participants at University of Zilina

In the key measurement part students learn to use event display programs and analysis methods used by experimental particle physicists. They first practice particle identification by exploiting the characteristic signals left by particles in various parts of the detector; electrons, muons, photons and jets of particles are then recognized. From here students reconstruct some known particles, such as the weak gauge bosons W and Z and a number of hadrons (J/ψ, Y, Λ, Ks). As a highlight of the day, they learn how to use the technique of invariant mass to search for the Higgs bosons and other so far hypothetical particles.

As our survey shows, about 50% of participants are interested to pursue career in natural science or engineering programs, the other half is interested in social sciences and humanities. We feel that it is of paramount importance that these future opinion makers in their field of interest take from our program a better appreciation and understanding of the role of science in modern society.

5. Cascade projects competition for high school teams

International Particle Physics Masterclasses are successful in motivating high school students. However, some students are ready for further adventure. Cascade projects competition is aimed at those who would like to spend some more time discovering the realm of particle physics. The format was developed at the University of Birmingham in 2006/2007. Teams of 3 - 6 high school students work for several weeks on projects

from particle physics and cosmology and then make 15 to 20 minute long presentations in their schools. The teams are helped by mentors (volunteers from the high energy physics community) and their teachers. Teams then send videos of their presentations to the Cascade organizers and the jury selects the best teams.

Fig. 2 Cascade team in the Great Final

The best team wins a trip to CERN or similar prize. The format is a success. Students enjoy working in teams and presenting in public (Fig. 2). In Slovakia about 15 teams enrol in the competition every year. Masterclasses is a good springboard for Cascade. Most of the teams are formed from former Masterclass participants.

The competition is relatively easy to organize. The first round (presentations at schools) does not require presence of the organizers which is very important given their tight work schedule. The best Cascade projects have the qualities we had hoped for: a solid scientific content and fresh, entertaining presentations which are fun to watch. Team members are often interested in pursuing a scientific career. Students effectively become our ambassadors in their schools – disseminating/cascading what they learned to many more young people than physicists could on their own. For more details see [25].

6. Conclusion

Particle physics probes nature at its most fundamental level often requiring large scale infrastructure and experiments invented, constructed and operated by large international collaborations involving thousands of physicists and concentration of large funds. With such large-scale endeavours, public interest arises and critics questioning the pros and cons are natural in democratic societies that can be addressed in an open dialogue to the benefit of society of which science is an integral part.

Scientists should respond to fears, worries and ambiguities of the public on the cost and results of their research in a proactive, honest, transparent and enlightening way. In this spirit reaching out to the broad public, to teachers, policy makers, science communicators, and in particular to the young generation is important to keep the light of science shining brightly in the world.

References:

[1] ATLAS Collaboration, *Observation of a new particle in the search for the Standard Model Higgs boson with the ATLAS detector at the LHC*, Phys. Lett. B 716 (2012) 1, 31 July 2012

[2] CMS Collaboration, *Observation of a new boson at a mass of 125 GeV with the CMS experiment at the LHC*, Phys. Lett. B 716 (2012) 30, 31 July 2012

[3] LIGO Scientific Collaboration and Virgo Collaboration, *Observation of Gravitational Waves from a Binary Black Hole Merger*, Phys. Rev. Lett. 116, 061102 (2016), 12 February 2016

[4] Icecube Collaboration, *Constraints on ultra-high-energy cosmic ray sources from a search for neutrinos above 10 PeV with IceCube*, submitted to Phys. Rev. Lett., 20 July 2016, e-print archive arXiv: 1607.05886 [hep-ex]

[5] LUX Collaboration, *Dark-matter results from 332 new live days of LUX data*, presented at Identification of Dark Matter, The University of Sheffield, 21 July, 2016, talk online http://luxdarkmat.org

[6] DELLA NEGRA, M., JENNI, P., VIRDEE, T. S.: Journey in the Search for the Higgs Boson: The ATLAS and CMS Experiments at the Large Hadron Collider, *Science,* vol. 338, No. 6114, pp. 1560-1568, December 2012

[7] BrainReleaseValve, *The CERN black hole*, YouTube video, www.youtube.com/watch?v=BXzugu39pKM

[8] *Study of potentially dangerous events during heavy-ion collisions at the LHC.* Report of the LHC safety study group; CERN Report CERN 2003–001, 28 February 2003. https://cds.cern.ch/record/613175/files/CERN-2003-001.pdf

[9] *The Safety of the LHC*, CERN backgrounder http://press.web.cern.ch/backgrounders/safety-lhc John Ellis et al., LHC Safety Assessment Group, *Review of the Safety of LHC Collisions*, http://cern.ch/lsag/LSAG-Report.pdf

[10] CERN, *Angeles & Demons: The Science behind the Story, Does CERN create black holes?*, http://angelsanddemons.web.cern.ch/faq/black-hole

[11] Decision of the 2nd Senate of the Federal Constitutional Court from 18.2.2010, AZ 2 BvR 2502/08, www.bundesverfassungsgericht.de/entscheidungen/rk20100218_2bvr250208.html : „Zur schlüssigen Darlegung möglicher Schadensereignisse, die eine Reaktion staatlicher Stellen erzwingen könnten, genügt es insbesondere nicht, Warnungen auf ein generelles Misstrauen gegenüber physikalischen Gesetzen, also gegenüber theoretischen Aussagen der modernen Naturwissenschaft zu stützen."

[12] „Spiegel Online", 9. March 2010, *„Wer hat Angst vorm Schwarzen Loch? Karlsruhe weist Weltuntergangsklage ab"*, www.spiegel.de/wissenschaft/technik/verfassungsgericht-karlsruhe-weist-weltuntergangsklage-ab-a-682514.html

[13] „La Dépèche", 9. March 2010: www.ladepeche.fr/article/2010/03/09/793121-allemande-craignant-fin-monde-echoue-paralyser-cern.html

[14] „FOCUS Online", 10. September 2008, *„Geht heute die Welt unter?"*, www.focus.de/wissen/technik/large-hadron-collider-geht-heute-die-welt-unter_aid_332205.html

[15] „Die Welt", 30. March 2010: *„Urknall-Experiment glückt ohne Weltuntergang"*, www.welt.de/wissenschaft/urknallexperiment/article6990263/Urknall-Experiment-glueckt-ohne-Weltuntergang.html

[16] Harry Cliff and Rupert Cole, *LHC Celebrates 5 Years of not Destroying the World*, Scientific American, September 10, 2013, http://blogs.scientificamerican.com/guest-blog/2013/09/10/lhc-celebrates-five-years-of-not-destroying-the-world/

[17] Andrei Linde, The Self Reproducing Inflationary Universe, Scientific American, Vol. 271, Nr. 5, November 1994, p. 53.

[18] "MailOnline"*, Finding the 'God' particle could destroy the universe,* www.dailymail.co.uk/news/article-2746727/Maybe-shouldn-t-looking-quite-hard-God-particle-destroy-universe-warns-Stephen-Hawking.html "Express", *'Could happen at any time'. God particle could DESTROY universe,* www.express.co.uk/news/nature/508102/End-of-the-world-Stephen-Hawking-God-particle-Higgs-boson-destroy-universe "Guardian Liberty Voice", *Stephen Hawking Believes Higgs Boson Particle May Destroy Universe*, http://guardianlv.com/2014/09/stephen-hawking-believes-higgs-boson-particle-may-destroy-universe/

[19] „Berliner Kurier", 9 September 2014: *„Stephen Hawking: Finger weg vom Gottesteilchen ... es könnte den Weltuntergang auslösen"*, www.berliner-kurier.de/panorama/stephen-hawking-finger-weg-vom-gottesteilchen—es-koennte-den-weltuntergang-ausloesen,7169224,28358282.html

[20] "Focus Online", 8 September 2014: *„Katastrophaler Vakuum-Abfall. Hawking warnt vor Raum-Zeit-Kollaps: Gottesteilchen könnte Universum zerstören",* www.focus.de/wissen/technik/kollaps-von-raum-und-zeit-hawking-gottesteilchen-koennte-universum-zerstoeren_id_4115983.html

[21] Don Lincoln, *What Hawking really meant*, "Symmetry", 11 September 2014, www.symmetrymagazine.org/article/september-2014/what-hawking-really-meant

[22] International Particle Physics Masterclasses, www.physicsmasterclasses.org

[23] International Particle Physics Outreach Group, http://ippog.web.cern.ch/

[24] JOHANSSON, K. E., KOBEL, M. et al.: European Particle Physics Masterclasses Make Students Scientists for a Day, *Physics Education*, 42, 2007, 636

[25] More information on Cascade in IPPOG database: http://ippog.web.cern.ch/resources/2011/cascade-projects-slovakia

Emil Betak - Franc Cvelbar*

DISCOVERIES AND OTHER INFORMATION IN PHYSICS AND ASTRONOMY OF THE LAST DECADE, WHICH HAVE A POTENTIAL TO INFLUENCE OUR VIEW ON THE UNIVERSE

In the last decade, natural sciences (sometimes called exact sciences) have nearly every week brought some discoveries or important news, which have consequences on our understanding of the world and the whole Universe, its past and future, and which may stimulate possible new philosophical look at the world and human beings in it.

We have selected several such cases and will try to present them to colleagues working outside the natural sciences to serve as motives for their work: i) Water, the basic liquid for our life, seems to be much more abundant (though not in clear form without ingredients) on and inside the Earth and in the Universe than was assumed still a decade ago. What does it mean and which are the consequences for us? ii) Is our Earth the only place of intelligent life in the Universe or not? What do both these possibilities mean for us, for philosophy, ethics and theology? iii) Nature is full of various surprises, which may come as a disaster in a global scale. Are we prepared to cope with them?

Keywords: *Water in the universe, life beyond Earth, habitable zone, threats from universe to our Earth.*

1. Introduction

There has been, is, and will be a long discussion about the origin, present state and about further destiny of our Earth and the Universe. Some of the results of the so-called exact sciences - especially in the 19th and in the first half of the 20th century - seem to contradict the Bible and were used as arguments against religious (Christian) approaches to the world. Discovery of the expansion of our Universe, and consequently the idea of the Bing Bang indicated that there was a beginning of both space and time. Since that, a lot of progress has been achieved both in exact sciences and in theological approach to and understanding of the question. Currently, the Big Bang is taken as a fact, which occurred some 13.8 billion years [1] ago. Other discoveries and ideas (to name only some of physics and astronomy) with deep impacts on our understanding of the world, were the emergence of quantum physics, discovery of the expansion of the Universe and the possibility of its huge inflation which at the extremely early times increased enormously the size of the Universe, ideas of dark matter and dark energy, which left only less than five per cent of the total mass for the matter as we usually understand it, the discovery of the Higgs boson (so-called the God's particle), detection of gravitational waves, etc.

We leave aside different possible explanations of the Exodus of Jews from Egypt across the Red Sea [1 and 2], the Higgs boson (rather often referred to as "the God's particle") and also gravitational waves, because these topics were subjects of many papers in the last years. We restrict ourselves to three wider topics which will be discussed below, namely *i)* the existence of (yet undiscovered) water on our Earth and elsewhere in the Universe; *ii)* is there an (intelligent) life in the Universe outside of our Earth?; and *iii)* possible (and/or probable?) threats to the life on our Earth.

2. Water in the Universe and "at home"

Water as the important chemical compound, which is necessary for the very existence of life (at least of the kind of life we know), was in the focus of investigations of bodies outside of our Earth. Some water was found in comets, which (even though they are able to extend their tail sometimes up to more than 100 000 000 km), however, are of negligible mass. Practically all mass of a comet is in its nucleus, which is usually less than 50 km in diameter. NASA already reported liquid water on Mars (see e.g. [3]), but the winners of this undeclared competitions are probably the moons of big planets, Jupiter and Saturn. Saturn's moon

* [1]Emil Betak, [2]Franc Cvelbar
[1]Institute of Physics, Slovak Acad. of Sci., Bratislava, Slovakia
[2]J. Stefan Institute, Ljubljana, Slovenia
E-mail: emil.betak@savba.sk

Enceladus, which has been a suspect already for a decade (Cassini orbiter found hydrothermal vents of salty vapor from the interior near Enceladus south pole in 2005, and the subsequent flybys confirmed ocean of about 10 km depth below 30 or more km of ice), hosts deep beneath its ice real oceans of water. If we consider only the confirmed Enceladus oceans, a rough estimate of their contents of water is about 50 times the amount of water in all oceans on the Earth together [3 and 4]. As Enceladus is relatively small (about 500 km in diameter), the assumed reason for keeping its interior hot is gravitational interaction between Saturn and its moon. The Enceladus conditions (salty warm water) lead some scientists to consider the possibility of life there [5]. Enceladus' "bigger brother", Jupiter's moon Ganymede (diameter about 5300 km), also signals presence of ocean(s) of salty water deep below the surface [6]. In addition, it has also a magnetic field (the only one confirmed at moons of planets till now), so one can observe polar light there [6].

However, one should not forget about our Earth. A great surprise came at the end of 2013 with a small scratched, clapped-out diamond from the Juína mine (Brazil). It contains a tiny piece of ringwoodite (olivine mineral). The diamond did not come from the outer space, therefore, it should be of Earth's origin. The ringwoodite (named according to A.E. Ringwood, Professor of geology at ANU) was confirmed by X-ray diffraction and by Raman and infrared spectroscopic data [7 and 8]. But in order to be created, this mineral needs a presence of high temperatures and high pressure and also of *liquid water (!)*. It is easy to answer where the high temperature and pressure can be found: beneath the surface of our Earth, in its mantle (in depths of about 400 to 700 km). But the only possible explanation of water is to conclude that the mantle contains a big amount of water, which is several ten times (or even a hundred times) more than all oceans, lakes and rivers on the Earth (!!). Months later, similar piece of ringwoodite was found also close to US-Canadian border...

Not without interest is the direct observation of water snow-line at V883 Ori [9]. If a (proto)star has still a protoplanetary disc, its parts close to the central star are hot and there is no chance to keep compounds like water (di-hydrogen oxide) or carbon oxides in their liquid state – they are soon melted and evaporated (or sublimated). In the very remote regions, these oxides are sufficiently below the surface. In the mean region, one can observe a bright ring (illuminated by the central star), which moves its forefront with occasional thermal instabilities (outbursts) of the protostar. It was observed with carbon oxides at TW Hya and HD-163296 (see the references quoted in [9]) and only very recently even with water [9].

3. Life / intelligent life in the Universe

A very surprising fact about our Universe is that the basic physical constants (constants valid for the Universe as a whole, not just describing local property at some place) are in very special relation, which is/was necessary for the creation of stars, galaxies, etc. If any of the values of these constants were changed by one part in a billion of its value, the present Universe would not be created or would already finish (see, e.g., [10]). In other words: "the basic physical constants must have exactly such values as they have - otherwise we would not exist here". This is what we call "a (weak) anthropic principle". There is also "a strong anthropic principle" saying that the Universe was created for us to live in it.

There has been a question for many centuries, whether we are alone in the Universe or do we have "brothers and sisters" somewhere? It is a trivial task to write the equation yielding number of planets with life (or even intelligent life) in our Galaxy or in the Universe as a whole. Such equations exist in many forms, and all of them have some common features; the most familiar of them is the Drake equation. While some of the terms in the equations are more-or-less known, like the average number of stars in a galaxy, percentage of stars with planetary systems, percentage of planets which orbit their sun within a habitable zone, etc. - at least with a precision of a factor one thousand up or down, there are two factors we cannot estimate at all, namely the probability that life really developed there; because keeping just the physical conditions, like temperature, gravity, presence of water, ... is just a set of *necessary* conditions, but not a *guarantee* that the life really is there (see also [11 and 12]). Another such factor in the Drake equation is the probability that the life there reached the intelligent level and that it is still within.

There are many approaches to getting answers about alien life (and especially its intelligent phase) beyond the Earth, from the point of view of (astro)biology, searching for the chemicals as markers of life, through geology, astrophysics etc. [11 - 16]. Being physicists, we'll write some notes on the estimates by Behroozi and Peeples [13]. They start considerations from estimating the number of Earth-like and giant planets (about 10^9 and 10^{10}, respectively), their time-dependence and elemental abundance. The process of planet formation continues with different speed for the Earth-like and the giant planets; giant planets are rare in low-mass galaxies. Median of giant planets ages (about 2.5 Gyr) is shorter than for Earth-like ones. The solar system formed after about 80 per cent of existing Earth-like planets. If we assume that gas cooling and star formation continues, the Earth was formed earlier than 92 percent of similar planets of the Universe. This implies 8 per cent chance that we are the only civilization the Universe will ever have (!). Well, 8 per cent is a small number, but many billion times larger than it would correspond to pure statistical formation of stars and their planets and, consequently, to the origin and development of (intelligent) life. Is this just a chance of statistics?

A lot of rumor has been very recently devoted to the finding of planet of Proxima Centauri (Proxima b), which is estimated to be by 30 per cent bigger (more massive) than our Earth and which is in a habitable zone [17]. Immediately after the discovery,

E. Tasker (one of leaders of the team which found a planet in the habitable zone of Proxima Centauri) cooled down the initial emphasis with several caveats [18]: *i)* Determination of both the mass and size is very unsure; the reported value of 1.3 Earth's masses is only the lower limit, whereas 70 Earth's masses is the upper one. Similarly, we know nothing about its size, and consequently about density - the planet can be (even though it is not much probable) also a gas giant planet. *ii)* Stating that Proxima b is in a habitable zone does not imply that it is habitable. It only says that its orbit is in such distance from the central star of the system that temperature on the planet surface (estimated by the amount of heat the planet receives) is reasonable. *iii)* The central star, Proxima Centauri, is a red dwarf. And red dwarfs are less stable stars than e.g. our Sun. *iv)* It is surprising, but (the planet) Proxima b *may not exist at all* (and all irregularities in brightness of (the central star) Proxima Centauri, interpreted as a presence of planet gravitation, could be caused by the irregularities and instabilities of the central star itself). *v)* Already several planets have been discovered with masses closer to that of Earth than it is in the case of Proxima b. Proxima b is not the first planet found within the habitable zone of some star. But ... *vi)* Even though Proxima b is a planet of our nearest star, using of present-day spacecraft would need some tens of thousands of years to reach it. Future possible spacecraft (currently only in a stage of ideas) would shorten this time to a few decades. This already sounds more reasonable. Further on, the remark of Taylor Redd [19] that planets have also their own source of heat, and the estimated distance from the central star of the system may be already in regions where life is not possible[2].

There is still one topic which could also be placed here. It is the star KIC 8462852 in the western wing of Cygnus (Swan) (star is nick-named "Tabby's star" according to Tabatha Boyajian, who discovered very special variations in its brightness) [20]. Variable stars are nothing special in astronomy, but usually the reason for periodic changes of their light is known: they can be binaries (system of two stars, when one eclipses the other while being on the line between it and the Earth), some kind of pulsations, or permanent irregular variations of brightness due to instable processes within the star. Here it is something rather different: Tabby's star has generally stable light flux, but completely irregularly it becomes for some hours (or even a day or two) fainter (never brighter than its standard). The difference in brightness is irregular as well: its brightness decreases by few per cent in local minima, but sometimes up to even 20 per cent. There is no acceptable explanation to such behavior, and possibly the most widely used is the assumption of *gigantic artificial constructions* (this means – say – from 300 000 km up to a million km or even more (!!)). One is afraid to accept that, but no alternative has been suggested yet.

4. Threats to the life on the Earth

Let us skip considering the possibility of a great war with inclusion of all possible weapons. Obviously, one cannot ignore such possibility, but the decisions of politicians and still more those of different criminal or terroristic groups and organizations are outside the frame of the present contribution.

Let us look back in history. In September 1859, a strong flash of brightness erupted on the Sun with the energy equivalent to 10 billion Hiroshima bombs. Massive coronal mass ejection released about trillion kg of charged particles, which at speeds close to 3000 km/s were flying over the space. In the Earth's magnetosphere they triggered the largest ever "solar superstorm" on record. This event was named the Carrington Event (R. Carrington spotted it as the first one). People could see intense polar light, but that was practically all. Some damage was done also on telegraph lines – at that time the only electrical infrastructure. But according to NASA's director of planetary science division J. Green, the Earth is in the path of similar event every about 150 years. What would do such flash today? The answer is simple: *i)* damage large portion of high-voltage lines (especially those going over long distances) and the transformers; *ii)* put the mobile phone networks, TV and radio broadcasting out of order; *iii)* disable various electronic automatic machines and instruments (including ATMs and cashiers in shops and petrol stations and electronic control at power plants, trains, airplanes, ...); *iv)* put out of order practically all computers, phones, tablets etc. which were on. Without electricity there will be no supply of water to houses (the pumps to higher floors use electric power), no possibility to fill your car with gasoline or diesel, banks will not be functioning. According to the considered scenario, this should last for a month or so, and the return to previous situation about one year [21]. Enough?

A more detailed study of possible threats from different sources has been presented by Rosen [22]. She puts the solar storm as the threat number one.

Threat number two is the danger of cosmic collision. Probably we are able to do something with small asteroids, if we know about them sufficiently in advance. But there is much smaller chance with objects above 1 km – and it is not so easy to observe a "newcomer" of that size. One threat from this group is the asteroid 101955 Bennu (originally 1999 RQ36), a diameter of about 500 m. It was already pretty close to the Earth couple of years ago, and the next close approach will be very close again, so that Earth's gravity could change its trajectory in the way that at the end of the 22nd century a direct contact with the Earth is not excluded. To minimize possible effects on our Earth, OSIRIS-REx spacecraft is to be launched on 8th September 2016, to study the asteroid for two years, take a sample and return it (in 2023) to Earth for further investigation [23 and 24]. The knowledge of Bennu would help us to find the most effective way to reduce the effect of possible future collision or avoid it at all.

Number three is possible explosion of a supervolcano. Obviously, it is not a danger from space, but from "our home". Supervolcano is the one which ejects more than 450 cubic kilometers of magma. It follows from the study of erupted material that such super eruptions tend to be repeated. Some of the known supervolcanos: Yellowstone, Long Valley Caldera (California) and Valles in USA, Cerro Galan in the Andes, Taupo Volcanic Zone (New Zealand) and Toba (Indonesia).

Number four is the fact that people are not prepared. They do not have enough reserves of water and food, and they think that they can behave under extraordinary conditions in the same way as they are used to.

5. Conclusions

Each new knowledge brings new questions. For the three groups of exposed facts, the questions may be the following ones:

First, water, which is an essential compound for the (intelligent) life as we understand it. and which was assumed rare in the Universe, appears to be abundant in our Solar system and it is found also in systems of distant stars. Does it imply the possibility of expansion of mankind to other worlds irrespective of immense obstacles?

Second, the civilization on our Earth is subject to permanent natural threats of cosmic and/or Earth origin (cosmic impact, supererruption of our Sun, explosion of supervolvanos and/or global earthquakes), but also those coming from the mankind itself (e.g. wars). Are we able to be sufficiently prepared to withstand all of it?

Third, the question possibly touching far future: are we alone in the Universe or are there other civilizations as well? If yes, how would the contact with them look like? Would it be a friendly one or a conflict of enemies? Are we able to prepare ourselves to survive it, when (and if) it comes?

There is much more interesting news from natural sciences, which could influence not only our view on the world, but also our life on the Earth. The choice we have made is a personal one, and has not passed any wide-scale evaluation of what really is the most important topic.

Acknowledgments

The work has been supported in part by the VEGA and APVV grants No. 2/0110/14 and No. 15-0225, respectively.

References

[1] HUMPHREYS, C.: Science and the miracles of Exodus. *Europhysics News*, 36 (2015), No. 5-6, 93-96.

[2] XU, W. B., RUCH, J., JONSSON, S.: Birth of Two Volcanic Islands in the Southern Red Sea. *Nature Comm,* 6 (2015), paper 7104.

[3] HALL, S.: Our Solar System is overflowing with Liquid Water. *Scientific American,* 1 January 2016, www.scientificamerican.com/article/our-solar-system-is-overflowing-with-liquid-water-graphic/

[4] BILLINGS, L.: First Active Hydrothermal System Found beyond Earth. *Scientific American ,* 11 March 2015, www.scientificamerican.com/article/first-active-hydrothermal-system-found-beyond-earth/

[5] SNEED, A.: Excitement Builds for the Possibility of Life on Enceladus. *Scientific American,* 28 June 2016, www.scientificamerican.com/excitement-builds-for-the-possibility-of-life-on-enceladus/

[6] KRAMER, M.: Jupiter's Moon Ganymede has a Salty Ocean with More Water than Earth. *Scientific American,* 13 March 2015, www.scientificamerican.com/article/jupiter-s-moon-ganymede-has-a-salty-ocean-with-more-water-than-earth/

[7] PEARSON, D.G., BRENKER, F.E., NESTOLA, F. et al.: Hydrous Mantle Transition Zone Indicated by Ringwoodite Included within Diamond, *Nature,* 507, 2014, 221-224.

[8] OSKIN, B.: Rare Diamond Confirms that Earth's Mantle Holds and Ocean's Worth of Water, *Scientific American ,* 12 March 20124, www.scientificamerican.com/article/rare-diamond-confirms-that-earth-s-mantle-holds-an-ocean-s-worth-of-water/

[9] CLEZA, L. A., CASASSUS, S., TOBIN, J. et al.: Imaging the Water Snow-Line during a Protostellar Outburst, *Nature,* 535, 2016, 258-261.

[10] HAWKING, S. W.: *A Brief History of Time. From the Big Bang to Black Holes* (in Czech), Bantam Books Inc.: New York, 1988, Mlada fronta, Praha, 1991, 123-124).

[11] SCHARF, C., CRONIN, L.: *Quantifying the Origins of Life on a Planetary Scale.* Proc. of Natl. Acad. of Sci., 113, 2016, 8127-8132.

[12] SCHARF, C.: Is Earth's Life Unique in the Universe? *Scientific American,* 15 July 2014, www.scientificamerican.com/article/is-earth-s-life-unique-in-the-universe?/

[13] BEHROOZI, P., PEEPLES, M. S.: On the History and Future of Cosmic Planet Formation, *Monthly Notices of the Royal Astronomical Observatory,* 454, 2015, 1811-1817.

[14] CHOPRA, A., LINEWEAVER, C. H.: The Case for a Gaian Bottleneck; the Biology of Habitability, *Astrobiology,* 16, 2016, 7-22.
[15] WITZE, A.: How to Hunt for Alien Life, *Nature,* 535, 2016, 474-475.
[16] DAVIES, P.: Maybe Life in the Cosmos is Rare After All, *Scientific American Blog Network,* 23 May 2016, www.blogs.scientificamerican.com/guest-blog/maybe-life-in-the-cosmos-is-rare-after-all/
[17] BILLINGS, L.: The Earth next Door, *Scientific American,* 24 August 2016, www.scientificamerican.com/article/the-earth-next-door/?WT.mc_id=SA_SPC_20160825
[18] TASKER, E.: Yes, we've Discovered a Planet Orbiting the Nearest Star but ... *Scientific American,* 26 August 2016, blogs.scientificamerican.com/guest-blog/yes-we-ve-discovered-a-planet-orboting-the-nearest-star-but/
[19] TAYLOR REDD, N.: Some "Goldilocks" Planets may be too Hot-Blooded for Life. *Scientific American,* 26 August 2016, www.scientificamerican.com/article/some-goldilocks-planets-may-be-too-hot-blooded-for-life/
[20] SCHAEFER, B.E.: The most mysterious star in the Galaxy. *Scientific American* 10 June 2016. blogs.scientificamerican.com/guest-blog/the-most-mysterious-star-in-the-galaxy/
[21] DALE, A.: What if a solar super-storm hit? *Physics World,* 27, 2014, No. 8, 22-27.
[22] ROSEN, J.: Thinking the unthinkable. *Science,* 353, 2016, 232. *(The same paper has been published on the web version of Science 14 July 2016 under the title "Here's how the world could end – and what we can do about it")*
[23] LAURETTA, D.S.: To Bennu and Back. *Scientific American,* 1 August 2016. www.scientificamerican.com/article/to-bennu-and-back.
[24] WALL, M.: Is Earth Safe from Asteroid Bennu? *Scientific American*, 2 April 2016 www.scientificamerican.com/article/is-earth-safe-from-asteroid-bennu.

[i] We use here the American convention (not the old British one!) for large numbers: billion = thousand times million = 10^9 (referred to as milliard in the British form), trillion = million times million = 10^{12} (= billion in the British style), etc.

[ii] Extrasolar planets are so far from us that one cannot measure their temperature directly. It is derived by calculating the flux from the central star and how it can warm the body of planet. For instance, our Earth receives only about 60 per cent of heat from the Sun; the rest 40 per cent originate from continuous nuclear reactions in its interior.

Stefan Luby - Martina Lubyova - Ladislav E. Roth*

SCIENCE IN THE TRAP OF FRAUD AND CORRUPTION

The expression pathological science was introduced by I. Langmuir already in 1953. Since that time the investments into science and competition have been increasing and, consequently, the ground for scientific misconduct continues to expand. In this paper we discuss the scientific fraud in its multiple forms, such as falsification and fabrication of data, plagiarism, trading with papers and co-authorships, defrauding of funds, incorrect grant practices, etc. We identify the driving forces of misconduct as career pressure, anticipation of results, and working in the field where experiments are not precisely reproducible. The most visible fraud examples with their statistical distribution among countries and branches of science are provided. While serious cases of misconduct appear in countries with top research excellence in the process of seeking positions, awards and prizes, in the developing world the typical forms include self-plagiarism, conflict of interests in grant policy, bribery, and corruption. Finally, we elaborate on the policies supporting the research integrity.

Keywords: *Ethics, fraud in science, comparative analysis, research integrity.*

1. Introduction

This work is part of an effort to provide a typology of fraud and misconduct in science in Slovakia. Our observation should be relevant to other countries also. We reflect upon the status quo that is characterised by such phenomena as the exodus of the young scientific talent, poor qualifications of the new professors, cloning of the recently established universities, lack of transparency in grant-awarding practices, self-plagiarism, acquisition of sizeable new research infrastructures without securing adequate operational base, and the dismissal of the leading personnel due to financial mismanagement. Unless these phenomena are recognised and addressed, our research capabilities may suffer irreparable damage.

2. Historical perspective

A popular picture of the pre-1989 scientist, as an ethically coherent personality who would invest all his/her time and even own money into the struggle for acquiring new knowledge, did not correspond to reality. Great intellectual hoaxes paved the way of science, research, and discovery already in the previous centuries. For instance, in [1] we can find stories about a Frederic A. Cook who asserted that he had reached the North Pole in April 1908, almost one year before Admiral Robert E. Peary. Another infamous example is Paul Schliemann, the grandson of the discoverer of Troy Heinrich Schliemann, who claimed to have proven the existence of Atlantis, using his own research and the documentation left by his grandfather [2].

Even the icons of physics and biology are not completely free of the stain of doubt. According to [3], Isaac Newton would introduce fudge factors in order to increase the predictive power of his work; Johann G. Mendel's results were too good to be true; Robert Millikan manipulated his measurements of the charge of electron to make the results more convincing, etc.

Irving Langmuir, Nobel laureate in chemistry, introduced the expression *pathological science* in December 1953. The talk was concerned with what he called "the science of things that aren't so". The lecture was transcribed and edited by R. N. Hall [4]. Langmuir analysed the results related to Davis-Barnes effect, so called N-rays and Mitogenetic rays, and he concluded that "these are the cases where there is no dishonesty...but people are tricked into false results by lack of understanding...wishful thinking or threshold interactions". Let us remind ourselves here of the symptoms of pathological science summarised by Langmuir [4]:

- The magnitude of the effect is substantially independent of the intensity of the causative agent.
- The effect is of magnitude that remains close to the limits of detectability; or, many measurements are necessary because of the very low statistical significance of the results.
- Claims of great accuracy.

* [1]**Stefan Luby,** [2]**Martina Lubyova,** [3]**Ladislav E. Roth**
[1]Institute of Physics SAS, Bratislava, Slovakia
[2]Centre of Social and Psychological Sciences SAS, Bratislava, Slovakia
[3]Emeritus, Jet Propulsion Laboratory, California Inst. of Technol., Pasadena,USA
E-mail: stefan.luby@savba.sk

- Fantastic theories contrary to experience.
- Criticisms are met by *ad hoc* excuses thought up on the spur of the moment.
- Ratio of supporters to critics rises up to somewhere near 50 % and then falls gradually to oblivion.

Also other examples given by Langmuir, such as the extrasensory perception, flying saucers, etc., sound old today; nonetheless, new problems do keep emerging.

3. Why does fraud appear?

The road from pathological sciene, which does not suffer from dishonesty to real scientific fraud is analysed by Park in his Voodoo Science [5]. He says: "What may begin as honest error, however, has a way of evolving through almost imperceptible step...to fraud." These steps are junk science, pseudoscience, and, finally, fradulent science. On this road there is less and less supporting evidence and more and more self-delusion. Finaly the thin line between foolishness and fraud is crossed.

The field of science is nowadays endowed with sizeable investments that inhibit the pathological effects and processes of the new type from inside the scientific circles, but also from outside. We can speak about *the rent-seeking behaviour.*

Governments have been supporting research and development systematically since the end of WW2 as a consequence of the decisive role science played in winning the war. (Examples of the scientific contributions applied at the battlefields are radar, nuclear weapons, encryption machines, armours, medicaments, etc.) In the United States a program of the government suport of science was formulated by Vannevar Bush, the science advisor to the US President in WW2. Bush's arguments and recommendations are contained in the document entitled "Science, the Endless Frontier". According to [6], the three motives active behind the scientific fraud are as follows: (a) the perpetrators are under career pressure; (b) they know or they think they know the answer to the problem being solved: accordingly, they attempt to shorten the road to fame and glory [1]; and (c) researchers often work in the fields where experiments are not precisely reproducible. This situation gives rise to the appearance of fraud in biomedicine, psychology, nanoscience, etc.

Nanoscience studies the intermediate state of matter between molecules and crystals where the primary quality transforms into a secondary one in a process of chaotic transition. The diversity of structures in the nanoworld is not studied or even cannot be any time studied thoroughly. Thus, it happens that nanotechnology is labelled as the alchemy of the 21st century [7]. It is criticised that published articles are often "polished narratives, which convey that everything went according to plan" [8]. Therefore, it is not surprising that the initiative for the reproducibility in nanotechnology comes in the foreground [9].

[1] It is noteworthy that at certain level of knowledge the discoveries or inventions, e.g. giant magnetoresistance or semiconductor laser, appeared independently in the same period at different places.

4. Classification of misconduct in science

As follows from [6] and [10] and from our own experience, the basic forms of misconduct in science can be classified as follows: (a) Fraud - falsification and fabrication of data, plagiarism and self-plagiarism; (b) Trading with publications including papers, citations and co-authorships, multiplication of journals and conferences; (c) Embezzlement of funds or deformed grant practices; (d) Science as playground for fraudulent business practices, e.g. with pharmaceuticals and dietary supplements.

Falsification means manipulation of research materials, equipment, processes, changing or omitting data or results. Fabrication includes making up data or results and recording or reporting them. Plagiarism means appropriation of another person's ideas, results or words without giving him/her due credit.

5. Most visible fraud examples in the developed world

In this section we provide a qualitative overview of the fraudulent behaviour in science by giving the examples of selected infamous cases [6, 11]. Among them, a considerable attention was paid to the so-called cold fusion (M. Fleischmann, S. Pons, Toyota), the announcement of new element 118 at Lawrence Livermore National Laboratory, where V. Ninov was supposed to fabricate data, or to the "discoveries" by J. H. Schön at Bell Laboratories, who falsified results in 17 publications including those in *Nature* and *Science*. Before the scandal was disclosed, he was called the *Tiger Woods of physics.* In the field of psychology, among the most visible cases was that of J. Förster from the University of Amsterdam. The examination committee concluded that the patterns in published papers were statistically impossible. At the time he was granted a prestigious appointment as the Alexander von Humboldt Professor at the Ruhr University, Bochum, with grant funds of approximately 5 million Euros. The reaction of the president of the Humboldt foundation was disappointing [12]. E. A. K. Alsabti, born in Iraq, is considered to be among the top plagiators. He picked articles from obscure journals, changed their titles and sent them under his own name to other obscure journals [11]. There is also a Nobel laureate, D. Baltimore, who has been involved in the fraudulent publication by one of his collaborators [11].

In order to proceed to a more quantitative overview, we quote the statistics of 48 notable misconduct cases in Table 1 [13]. It can be seen that the fraud flourishes mostly at top research units in the countries with top research excellence, where the motivation is strong in the quest for prestigious positions and grants. This is obviously not the case of Slovakia. The European

Commission evaluated the scientific excellence in Europe [14], based on a simple algorithm using indicators related to ERC grants, patenting, ranking of universities, and the most highly cited papers. According to this evaluation, the EU average score was 48, while that of the Netherlands was 79, Germany 63, Czech Republic 30, and Slovakia 18.

Ranking of countries in notable scientific misconduct cases Table 1

Country	No. of cases	Country	No. of cases
Canada	1	Norway	2
China	1	Romania	2
Denmark	1	Saudi Arabia	1
Germany	4	South Africa	1
Great Britain	4	Republic of Korea	1
Israel	1	Spain	2
Japan	5	Switzerland	1
Netherlands	3	USA	18

Source: [13]

6. Publication bazaar

A similar expression was used in [10] to characterise the situation in fast developing countries, esp. in China. The research capacity of China is estimated to be about 1 million full-time equivalents (FTE). This represents a quantitative growth that opens the door also to various phenomena in terms of ethics. The publication business is flourishing, the gold standard being a paper in a top journal. Reportedly, the prize for co-authorship can be as high as 25 000 USD. Papers can be edited without proper experiments. Adhering to the "tradition of leaps" China strives to make a major move ahead also in science. However, in this field the way to success is slow and bound by the historical developments. For example, by analysing the Nobel prizes granted for physics, we can show that at present the position of the United States (winning about half of all prizes) is rather stable, while the UK is going down and Germany with Japan are slowly rising. At the same time, no positive shift in the developing world is observed. The only positive tendencies in the developing world are driven through double affiliations, such as, for example, India or Taiwan with the UK or USA, etc. It should be mentioned, however, that the fast growth in China and India is largely behind the quantitative growth of world publications that continue to be exponential (since 1900); whereas the time needed for duplication of the world number of papers is 11.8 years.

7. The problems in central and eastern Europe, including Slovakia

Among the central problems in the CEE region we consider the prevalence of quantity over quality. This is caused, inter alia, by the plagiarism that occurs at all levels of scientific work, including at the early stages of earning the diplomas. Self-plagiarism, multiplication of publications, and mutual co-authorships are quite common. The factors that contribute to these phenomena are the strong focus on scientometric evaluations, many grants with under-threshold financing, pressure for acknowledgements, etc. For example, it follows from our not yet published analysis that in the CEE there are on average more authors per paper than in the Western Europe. However, not all CEE countries have a similar access to the solution of these problems. E.g. Poland developed already four systems for the control of plagiarism [15].

A qualitatively new situation in CEE has emerged due to the availability of the EU structural funds. In this respect, it is worth attention to read in the paper [16]:"A scientific oligarchy with close ties to policymakers writes the rules for the transfer of unprecedented amounts of public money into (semi-) private firms purchasing overpriced, duplicated or even useless equipment". It is assumed that the percentage of funds that were involved in corrupt activities is > 20% [17], but this is a very conservative estimation.

In Slovakia the growth of publications does not follow the world trends, which we think is not a critical problem. The number of citations is growing due to the new phenomenon of massive quotations by the Chines researchers (mainly in the natural sciences), more careful individual record-keeping, new databases such as Scopus, or incorporation of conference proceedings into monitoring process. A serious problem in the CEE is the low level of patenting. In order to illustrate the gravity of the problem, it is enough to note that Austria has more patents that the whole CEE [18]. In addition to the common CEE factors, the Slovak situation is characteristic by the institutionally embedded conflict of interests in grant agencies, whereas the evaluation of the projects has to be done by the members of the small research community.

8. Closing Remarks

The twentieth century was not a century of dramatic increase of fraud, rather of its increased exposure. The future in this field is also linked to the processes of globalised access to information and more transparent environment. One can no longer assume the misconduct cases to be isolated phenomena while that majority of them will never be disclosed. It is assumed that the rise of open publication on the internet will be favourable for the disclosure of misconduct [11]. In electronic publications the readership is broader and the access is simpler. This enables the not-cited

authors to detect and protest various cases. Also the pressures to condense text ("*these data are not shown here*") disappear.

The most crucial role in the fight against the fraudulent behaviour in science has to be played by institutions. Their responses, the setting of rules, and their enforcement are central. However, the responses by senior scientists and administrators have not proven to provide useful models for curbing the negative phenomena and practices described in this paper.

As examples of institutional attempts to deal with fraudulent behaviour let us mention the approach at Caltech [6] where the consecutive steps are: removal from the project, letter of reprimand, special monitoring of future work, probation or suspension, salary or rank reduction, and termination of employment. The Chinese Academy of Sciences responds to the "publication bazaar" by its program of moral integrity [10]. European Commission issued a Code of Conduct in nanoscience and nanotechnology [19], etc.

The Slovak scientific community has to pay more attention to the problems of fraud, misconduct, and integrity of science. Slovakia is lagging behind in this field, likewise in several others areas, including the scientific excellence. Otherwise a legitimate question can be asked as to the extent to which our science can be self-correcting, which is bordering on the issues of self-governance in science.

References

[1] SILVERBERG, R.: *Scientists and Scoundrels*. Lincoln: London: University of Nebraska Press, 2007, p. 108. ISBN 13 978-0-8032-5989-8.

[2] ibid, p. 163.

[3] BROAD, W., WADE, N.: *Betrayers of the Truth.* New York: Simon & Schuster, 1982, p. 23. ISBN 0-671-44769-6.

[4] LANGMUIR, I.: Pathological Science: Scientific Studies Based on Non-existent Phenomena. Edited by R. N. Hall. *Speculations in Science and Technology,* 1985, 8, 2, 77-94.

[5] PARK, R. L: *Voodoo Science. The Road from Foolishness to Fraud*. Oxford: Oxford University Press, 2000, p. 10. ISBN 0-19-513515-6.

[6] GOODSTEIN, D.: *On Fact and Fraud*. Princeton: Oxford: Princeton University Press, 2010, p. 3, p. 64, 29-106, p. 135. ISBN 978-0-691-13966-1.

[7] McCARTHY,W.: *Hacking Matter*, http://www.wilmccarthy.com/hm.htm

[8] MUECK, L.: Report the awful Truth. *Nature Nanotechnology,* 2013, 4, 10, 693-695.

[9] Joining the reproducibility initiative. Editorial. *Nature Nanotechnology,* 2014, 9 (Dec.), 949.

[10] HVISTENDAHL, M.: China's Publication Bazaar. *Science,* 2013, 342, 6162, 1035-1039.

[11] JUDSON, H. F.: *The Great Betrayal: Fraud in Science*. Orlando: Harcourt Inc., 2004, p. 151, p. 109, p. 191, p. 325. ISBN 0-15-100877-9.

[12] SCHWARZ, H.: Honesty in Science - a thing of Past? *Humboldt Kosmos,* 2015, No. 104, p. 17.

[13] https://en.wikipedia.org/wiki/Scientific_misconduct

[14] EUROPEAN COMISSION: *Research and Innovation Performance in EU Member States and Associated Countries.* Edited by J. Stierna, and P. Vigier: Brussels: DG for Research and Innovation, 2013, p. 5. ISBN 978-92-79-22832-2.

[15] http://www.rsc.org/chemistryworld/2013/10/poland-gets-serious-plagiarism

[16] TOMASKA, L., NOSEK, J.: Opinion: Science in a Small European Country. *The Scientist*, 28.1.2014.

[17] BALAZ, V.: www.aktuality.sk, April 27, 2014.

[18] STRAUSS, J.: *Personal communication*.

[19] EUROPEAN COMISSION: *Commission Recommendation on a Code of Conduct for Responsible Nanosciences and Nanotechnologies Research*. Brussels: DG for Research, EUR 23906, 2009, 21 p. ISBN 978-92-79-1-11605-6.

Pavel Hanes - Bram de Muynck*

DEIFICATION OF TECHNOLOGY AND THE DIGNITY OF THE HUMAN PERSON

Technology empowers and enslaves at the same time. Given our proneness to misjudgment and abuse of power, the dangers of technological failure and catastrophe are well known and often discussed. Technological and legislative measures are effective up to a point, but they usually ignore the dignity of the human person that is inalienably related to personal identity, freedom and meaning. So, before we propose new ethical rules we need to make sure they respect the dignity of the human person. The following study chooses the three characteristics of the dignity of the human person as starting points for properly defined ethics. It aims to strengthen ethical awareness and debate in domains where technology becomes confronted with the interests of humanity.

Keywords: *Technology, human person, dignity, deification.*

1. Introduction

The theme of our paper juxtaposes two areas of human knowledge: the natural sciences and the humanities. The first type of knowledge (science, technology) [1, p. 598] has been very successful in creating basic unity among the scientists, while the other (the humanities) is notoriously fraught with controversy. The progress of science and technology created great hopes about the coming of the better and bright future [2] but after the two destructive world wars, and enormous ecological problems caused by human interventions, there has grown a general skepticism about the potential of science both to further well-being and to overcome global challenges. The progress in science has not been accompanied by a similar progress in morality.

The problem has been aggravated by the opposite attempts of the natural sciences and the humanities to define the philosophical areas of ontology, epistemology and axiology solely in their own terms and by their own methods. This is what some authors have labeled "deification" – making the claims of one type of knowledge absolute. Such developments make cooperation and mutual respect very difficult. Nevertheless, the survival of humanity today requires a *modus vivendi* (ethics) based on some foundational principle acceptable to both sides.

Using some historical and philosophical arguments, we want to demonstrate that the foundational principle of such ethics can hardly be anything else than the common idea of human dignity which is experienced and understood in quite similar ways by all humans. In our opinion, recognizing this *epistemological* common ground can be used as a *method* to reach common agreement on the principles of a viable ethics for contemporary humanity.

2. The two cultures

In 1959, physical chemist and novelist C. P. Snow, gave his lecture on "Two Cultures" [3, p. 4]. He said the literary intellectuals were haughty and ignorant. For him the knowledge of the Second Law of Thermodynamics is "...about the scientific equivalent of: "Have you read a work of Shakespeare's?" [3, p. 15] and he goes as far as asking a rhetorical question: "Didn't the influence of all they [the literati] represent bring Auschwitz that much nearer?" [3, p. 7]. Snow was answered by the literary critic F. R. Leavis who made such an angry reply in his 1962 lecture that the debate is still remembered for the strong words he used [4].

Our task is to analyze how the "Two Cultures" split [5] relates to the deification of technology and the dignity of the human person, and so we are going to focus on the philosophical foundations of ethics. The question we are asking is: Is it possible to found and develop ethical theory accounting with the existing two cultures? In order to find an answer, we firstly explain three epistemological options and their ontological implications. Secondly, we describe two dynamics of deification that can go

* [1]**Pavel Hanes,** [2]**Bram de Muynck**
[1]Department of Theology and Catechetics, Faculty of Education, Matej Bel University, Banska Bystrica, Slovakia
[2]Driestar Educatief, Gouda, Netherlands
Email: pavel.hanes@umb.sk

hand in hand with the two cultures. Thirdly, we formulate a stance from which a valid ethics can be developed, and by which we can deal with the three problems caused by the tension between the scientific-technological culture and the domain of the humanities. We conclude with a few remarks about the proposed question.

3. Three epistemologies

Ever since Immanuel Kant, epistemology has been at the centre of philosophical analysis . Metaphysics (ontology) and axiology have since been discussed as disciplines whose very existence is either doubtful or, at best, derived from the way the human mind constructs what we call "knowledge". Discussing the relationship between different types of sciences (fields of *knowledge*), we treat the traditional three core areas of philosophy (ontology, axiology, epistemology) from the epistemological viewpoint. The ontological and axiological positions generally depend on the chosen epistemological theory (concerning the sources and the limits of knowledge), so we cannot draw a sharp line between them.

The attempt to build the epistemology of the humanities on the lines similar to the natural sciences has failed. In our opinion, one of the reasons is the over-estimation of *physicalism* that claims that the world is essentially and entirely physical [6].

The postmodern social scientists approach the problem from the opposite direction – *social constructivism* makes an astonishing claim that even the natural sciences belong to social reality and its *interpretation* [7].

Dualism, the third view, has been called "the official doctrine", but labeled "absurd", by Ryle, since, he says, physical concepts belong to another category of language than mental concepts [8]. (Daniel Dennett says dualism is "forlorn" and he has been on the defensive ever since the Ryle's attack [9]).

In order to clarify the three positions, we shortly discuss the difficulties of each. Physicalism suggests two difficult fundamental questions: (1) "What is this scientific method that is alleged to be the key to the success of physics?" and (2) "Is it legitimate to transfer that method from physics and apply it elsewhere?" [10]. In the opinion of Hilary Putnam, "'scientizing' the social sciences is a confusion and a source of confusion" [11, p. 76]. The answer to the first question is that finding causal relationships between phenomena has been greatly successful. By keeping strictly to this paradigm science has brought a lot of revolutionary insights. The application of this paradigm (say to historiography), however, raises many problems. How can we, for example, prove by empirical testing that event A in 1600 caused event B in 1601?

The difficulties of the thoroughgoing social constructivism are obvious to all realists: "...in order to claim that they have made their case, cultural constructivists must demonstrate that their arguments for unreliability outweigh those of conventional scientific papers for reliability *in the realm of phenomena addressed by the latter*" [12, p. 49].

The often-discussed difficulty of dualism is "...how a person's mind and body influence one another..." [13, p. 2], in other words "A ghost in the machine is of no help in our theories unless it is a ghost that can move things around" [14, p. 35].

Mathematician and philosopher A. N. Whitehead neatly summarized the three views in one sentence: "There are the dualists, who accept matter and mind as on an equal basis, and the two varieties of monists, those who put mind inside matter, and those who put matter inside mind" [15, p. 82].

4. Deification – on both sides

Deification/divinization is negative for all sides – for theists: it is idolatry, for atheists: it is nonsense. According to both of these positions deification is a threat because it makes somebody or something into an ultimate ruler of human affairs. If it is not really God (who has no need of it), it will always fail to fulfill the manifold needs of human existence, leading instead to enslavement and sufferring. In religion, deification/idolatry is as old as religion itself, in science it is closely related to the idea of *progress*.

The origins of the idea of progress can be traced to the Judeo-Christian idea of salvation history. In the beginning of modernity scientific scholars believed in God as the great mover. Science was only helpful in getting to understand the ongoing process. This position is known as 'deism'. Later on, great scholars no longer assumed that the initial force was necessary [16]. Such progress has the attributes of the personal God - it is an incontestable force (˜ the omnipotence of God), it is positive (˜ the goodness of God) and gives rational results (˜ the wisdom of God) [17, p. 400]. This description can be labeled as *deification* [18]. The deified progress, in turn, leads to deified technology as "the culture seeks its authorization in technology, finds its satisfactions in technology, and takes its orders from technology" [19, p. 71].

On the other hand, the current postmodern idea of science can be viewed as a cultural construct motivated by the resentment against the enslavement of the human psyche by technology. We can perceive in it deification of human beings [20] standing against the deification of impersonal technology. Here, humans are viewed as *creators* of reality which is the prerogative of Divine Being. The optimism, that human creativity can bring peace and well-being independent of laws given by nature, is a dangerous delusion.

These are the two extreme positions: divinization of technology and divinization of the human culture. (Of course, there are also positions that avoid these extremes, but in our opinion, dealing with polarities is a better way to mutual respect and understanding.) How can we avoid the process of deification we have observed in the two positions described above?

5. Ethics, technology and human dignity

Ethics is often taken to mean "a set of rules for right conduct". The view of ethics as a certain collection of commandments is apparently supported by the Decalogue of the Bible. But a closer look will prove that the laws of the Decalogue are given as the expression of the attributes of God without whose authority these rules lose their coherence and ultimate meaning.

Aristotle in his Ethics begins with the description of the nature of human life, and only after that he proceeds to discuss ethical conduct [21, p. 153]. Postmodern ethical theories tend to disagree with the Aristotelian steps of reasoning (i.e. – first articulate the essentials of the phenomenon and only then proceed to discuss its implications), but we use the Aristotelian method by first formulating the essential starting point – what it means to be human. It is also our opinion, that the "problem [of contemporary ethics] revolves around the modern concept of the self" [22, p. 17]. The terms "self" and "personal identity" are often considered and used as synonyms. The idea of the self/identity has been explained (and denied) in very different and contradictory ways both in philosophies and religions.

In whatever waywe explain *what it is* to be a human person, we do not want *to be treated as less* than *what we intuit* by it. The *explanation* may be difficult or impossible, but the *experience* is common enough that we can communicate it.

Personal dignity in its relation to science and technology can be discussed in three analogous problems:

(1) The problem of atomism and individuation;
(2) The problem of determinism and human freedom;
(3) The problem of power and meaning.

The first problem is related to the rise of science and technology at the beginning of modernity. To clarify causality, scholars in the 16th century started to split up reality into its building parts. The study of the human body required cutting it – otherwise it was impossible to analyze what was inside. Analysis led to fragmentation which in turn led to impairing of the unity of the human person, of the self. But psychology defines individuation as a process of a person's "identification with the totality of the personality, with the self" [23, p. 138], and as "a separation and differentiation from the general, and a building up of the particular" [24, p. 562]. Such *experience* of selfhood is sufficiently common and we can agree it should not be brushed away by use of technology, however promising it looks, and, occasionally, is very necessary (for example in certain physical or psychological problems). Whether we agree with the Catechism of the Catholic Church that the "dignity of the human person is rooted in his or her creation in the image and likeness of God" [25], or we assent to Kantian ethics that "human worth elevated above all price" [26, p. 93] inheres in human freedom, or we concur with naturalism that human dignity does not presuppose human freedom, we are likely to agree that human beings are to be treated with dignity, which means with respect for this unique non-fragmented wholeness. "We agree on these rights, providing we are not asked why" [27, p. 77].

The second problem is how to account for the foundations of freedom. The human dignity and selfhood are coterminous with the idea of human freedom [28]. The real problem lies less in the fact of *causation* of human behavior than in the question whether the origins of behavior are *internal* in relation to the self that is an ontological unit [29, p. 48]. Some philosophers of science face these issues by proposing the theory of non-reductive physicalism [30], others espouse the theory of emergentism [31, p. 239]. Recently this position has got even more radical. Research in neuroscience has shown that even emotions can be predicted by the neurological processes in the brain [32]. Nevertheless, for those who disagree, determinism makes the universe a prison [33, p. 155]. The powerful concepts of the so called "folk psychology" (e.g., desire, pain, pleasure) [34, p. 5] would be emptied and become just involuntary states originating in the impersonal processes of nature.

But whatever their view of the matter is, in ethics scholars of different epistemological persuasions still adhere to the presupposition of freedom: we reward virtue and punish vice. So again, on this basis we should be able to communicate about ethics even if we disagree about its *foundations* [35, p. 83]. Of course, focusing on human dignity cannot mean that the discoveries of e.g. neurological laws should be ignored; nevertheless, human dignity will always be *foundational* because it is *universal*.

The question "What does it mean to be human?" becomes even more acute when we consider the third problem – the relationship between *power* and *meaning* [36, p. 215]. Technology gives *power* that is the ability to influence and control something. Having power means being in control. But however powerful we become by using technology, we cannot derive meaning of life from it [37, p. 5]. The paradoxical situation is that while we have become incomparably more powerful, we have become also incredibly more insignificant. "Nature, in ceasing to be divine, has ceased to be human", said John Dewey [38, p. 8]. We can give examples in professional care and in education. Technical devices are very effective and can affect many parts of the body in one instant. And too often it happens without the consent of the person touched. In education – the learning process can be controlled by tests and interventions that disregard the vulnerability of the pupils. Science and technology pose threat to the human dignity and meaning and cannot be the sources of meaning.

Psychiatrist Viktor E. Frankl said that one of the three important avenues to meaning in life is love [39]. It is important, then, to know how power [40] that comes from technology relates to love. Love presupposes openness and openness makes one vulnerable. Vulnerability – susceptibility to injury – is a very negative concept everywhere – in medicine, politics, sociology, psychology, etc. Everywhere it is the exercise of power that gives

protection from being harmed [40, p. 4]. But if dignity of a human being inheres in love, we must find ways of renouncing power for the sake of a real relationship of love. Although voluntary vulnerability in a relationship of love is basic to Christian doctrine [41] today, many psychologists point out its fundamental necessity in good relationships [42]. A person finds her/his real identity in places where she/he is vulnerable and also true character of one's partner is revealed in spots where she/he is vulnerable. In turn, such encounters help to discover life meaning [43]. We can conclude that while science and technology empower us, they also make us less able to enter natural and fully human relationships. This is the case, especially if we do not recognize empowerment as a danger and do not make voluntary adjustments by refraining from using technology where it could deform our real identity and manipulate or enslave others into subhuman behaviour.

But stressing the importance of vulnerability for the discovery of the meaning of life should not mean that we neglect the positive aspects of technology. So, the guiding rule that comes up here is twofold: On the one hand, the power of technology can be utilized if the vulnerability of human person is protected and safeguarded; on the other hand, its use should be restricted in cases when human vulnerability is unprotected.

6. Conclusion

The discussion between the natural sciences and the humanities has led to what some thinkers call "science wars". On both sides we have seen excessive valuation of the authority and applicability of respective types of knowledge and methods – this has been called "deification" or "divinization" of science, technology and human ego. Such division stands in the way of constructive discussion of badly needed ethical response to new technologies that threaten human dignity. The dignity of the human person, (recognized by all parties) can point the way out of difficulties and help us find directions in ethical dilemmas. We have seen that the three aspects of dignity – identity, freedom and meaning of life – can give us clues for decisions that will be acceptable both for those who work in the natural sciences and for those who are engaged in the humanities.

References

[1] COLLIN, S.: *Dictionary of Science and Technology,* London: A&C Black, 2007. ISBN 9780713686517.

[2] TAYLOR, C.: *A Secular Age,* London: Belknap Press & HUP, 2007. ISBN 9780674026766.

[3] SNOW, C. P.: *The Two Cultures,* Cambridge: CUP, 2012. ISBN 9781107606142.

[4] Snow's lecture "was conceived and written by someone who had not had the advantage of an intellectual discipline of any kind". LEAVIS, F. R.: *Two Cultures? The Significance of C. P. Snow,* Cambridge: CUP, 2013, 56, 59. ISBN 9781107617353.

[5] Isaiah Berlin discusses the controversy as *The Divorce between the Sciences and the Humanities*. BERLIN, I.: *Against the Current,* New York: The Viking Press, 1980, 80. ISBN 9780670109449.

[6] NAGEL, E.: Physicalism. *The Philosophical Review*, vol. 74, No. 3, 1965, 339-356. ISSN 0031-8108. It is important to reflect critically whether "the proud pursuit of objectivity without a recognition of human limitations, and the dimension of subjectivity in the process, has proved to be a dead end that emits the stench of manipulation, loss of human dignity, and finally nihilism." VALCO, M. & VALCOVA, K.: The Epistemological Challenge of Kierkegaard's Truth is Subjectivity Principle. *Communications - Scientific Letters of the University of Zilina,* vol. 16, No. 3, 2014, 25-28. ISSN 1335-4205.

[7] From the several expressions of constructivism we render the radical version for reasons of clarity of the argument. DOWNES, S. M. *Constructivism*. In *The Shorter Routledge Encyclopedia of Philosophy.* CRAIG, E. (ed.), London: Routledge, 2005, 147. ISBN 9780415324953.

[8] RYLE, G.: *The Concept of Mind*, London: Routledge, 2009, 1,6. ISBN 9780226732961.

[9] DENNETT, D.: *Consciousness Explained,* New York: Back Bay Books, 1991, 33. ISBN 9780316180665. Nevertheless, authors writing in 2008 see it more positively. See ANTONIETTI, A., CORRADINI, A., LOWE, E. J. (ed.): *Psycho-physical Dualism Today*. Lanham: Rowman & Littlefield, 2008, vii. ISBN 9780739123843.

[10] CHALMERS, A. F.: *What Is this Thing Called Science?* Indianapolis: Hackett Publishing, 1999. ISBN 978-0872204539.

[11] PUTNAM, H.: *Meaning and the Moral Sciences,* London: Routledge, 2010. ISBN 978-0415581240.

[12] GROSS, P. R., LEAVITT, N.: *Higher Superstition,* Baltimore: JHUP, 1997. ISBN 9780801857072.

[13] RYLE, G.: *The Concept of Mind,* Chicago: University of Chicago Press, 2000. ISBN 9780226732961.

[14] DENNETT, D. C.: *Consciousness Explained,* Boston: Little, Brown, 1991. ISBN 978-0316180665.

[15] WHITEHEAD, A. N.: *Science and the Modern World,* New York: Macmillan, 1925.

[16] TAYLOR, C.: *A secular Age,* Cambridge: HUP, 2007, 221-295. ISBN 9780674026766.

[17] E.g. Adam Smith's "invisible hand" is suggestive of the "hand of God". SMITH, A.: *The Wealth of Nations I*., London: J. M. Dent & Sons, 1957.
[18] "Treating of anything as a god", *Oxford English Dictionary (e-version)*. Oxford: OUP, 2009. ISBN 9780198611868.
[19] POSTMAN, N.: *Technopoly,* New York: Vintage Books, 1993. ISBN 978-0-8047-4273-3.
[20] Deification (*theosis*) of man in theology is another expression of the theological doctrine of the Christian life as "being in Christ".
[21] IRWIN, T.: *The Development of Ethics,* Oxford: OUP, 2007. ISBN 9780198242673.
[22] MENSCH, J. R.: *Ethics and Selfhood,* New York: State UNY, 2003. ISBN 9780791457528.
[23] JUNG, C. G.: *Analytical Psychology,* New York: Vintage Books, 1970. ISBN 9780394708621.
[24] JUNG, C. G.: *Psychological Types,* New York: Pantheon Books, 1953.
[25] *Catechism of the Catholic Church*, #1700.
[26] KANT, I.: *The Moral Law,* New York: Hutchinson's University Library, 1947.
[27] MARITAIN, J.: *Man and the State,* Washington: The CUA Press, 1998. ISBN 9780813209050.
[28] But we also can find: "Retribution as a moral principle is incompatible with a scientific view of human behaviour." (https://www.edge.org/q2006/q06_9.html#dawkins (22. 7. 2016)
[29] SKINNER, B. F.: *Beyond Freedom and Dignity,* Harmondsworth: Penguin Books, 1976. ISBN 9780140216615.
[30] Physicalism in which some entities cannot be *reduced* to physical entities.
[31] MEEHL, P. E., SELLARS, W.: *The Concept of Emergence,* FEIGL, H., SCRIVEN, M. (ed.) *Minnesota Studies in the Philosophy of Science, vol. I,* Minneapolis: UMP, 1968.
[32] SWAAB, D.: *We are our Brains from the Womb to Alzheimer's,* New York: Penguin Books, 2015. ISBN 9780141978239.
[33] BERLIN, I.: *Liberty,* Oxford: OUP, 2002. ISBN 9780199249893.
[34] CHURCHLAND, P. M., CHURCHLAND, P. S.: *On the Contrary,* Cambridge: A Bradford Book, 1998. ISBN 9780262531658.
[35] DENNETT, D.: *Elbow Room,* London: OUP, 1984. ISBN 9780262040778.
[36] PUTNAM, H.: *Philosophical Papers 2,* Cambridge: CUP, 1997. ISBN 9780511625251.
[37] There are several other mechanisms in technology that threat meaningfulness, we cannot discuss in extent. A well-known example is the danger for intimate relationships. Technology in media causes enormous streams of indirect communication instead of direct communication. "If power positions become rigidly entrenched, then lines of communication also begin to close down and intimacy rapidly deteriorates." LAYDER, D.: *Intimacy and Power,* Basingstoke: Palgrave Macmillan, 2009. ISBN LAYDER, D.: *Intimacy and Power*. Basingstoke: Palgrave Macmillan, 2009. ISBN 9780230245143.
[38] DEWEY, J.: *Characters and Events I,* New York: Henry Holt and Co., 1929.
[39] The other two are: creative work, love and growing beyond oneself (in suffering). For more on the topic of how personal experience of WW1 a WW2 influenced many important thinkers, see: KRALIK, R.: Kierkegaard and his Influence on Tillich's Philosophy of Religion, *European J. of Science and Theology*, vol. 11, No. 3, 2015, 183-189. ISSN 1841-0464; PAVLIKOVA, M.: The Concept of Anxiety and its Reflection in Auden's Work 'the Age of Anxiety, *European J. of Science and Theology,* vol. 12, No. 4, 2016, 111-119. ISSN 1841-0464.
[40] For analysis of types sociological power see RUSSELL, B. *Power,* London: Routledge, 2004, 23n. ISBN 9780415325073.
[41] "Both Kierkegaard and Bonhoeffer invite us to cultivate human *self* that is aware of *the other* and puts oneself in relationship with the *other*, for it knowingly receives one's being, value and direction from the Divine *Thou".* VALCO, M.: The Concept of the Subject and Faith, Ljubljana: KUD Apokalipsa & CERI-SK, 2016, 96. ISBN 978-961-6894-79-1. For more on the contemporary relevance of existentialist interpretation of human being, see: VALCO, M., KRALIK, R. & BARRET: Moral Implications of Augustine's Philosophical and Spiritual journey in his Confessions, *Communications - Scientific Letters of the University of Zilina*, vol. 17, No. 3, 2015, 106. ISSN 1335-4205; KONDRLA, P. & KRALIK, R.: Authentic being and Moral Conscience. *European J. of Science and Theology,* vol. 12, No. 4, 2016, 155-164. ISSN 1841-0464, KONDRLA, P. & PAVLIKOVA, M.: From Formal Ethics to Existential Ethics. *European J. of Science and Theology,* vol. 12, No. 3, 2016, 101-111. ISSN 1841-0464; VALCOVA, K.: Thinking with Kierkegaard about Current Challenges in our 'Practice in Christianity'. *European J. of Science and Theology,* vol. 12, No. 2, 2016, 203-212. ISSN 1841-0464.
[42] BROWN, B.: *Daring Greatly*. New York: Gotham Books, 2012. ISBN 978-1592408412.
[43] VALCOVA, K., PAVLIKOVA, M., ROUBALOVA, M.: Religious Existentialism as a Countermeasure to Moralistic Therapeutic Deism. *Communications - Scientific Letters of the University of Zilina,* vol. 18, No. 3, 2016, 101-102. ISSN 1335-4205.

Dalibor Gonda - Petr Emanovsky*

THE CONTRIBUTION OF TEACHING LOGIC TO ETHICAL DECISION MAKING

Everyone makes many important decisions in one's life and these decisions are the result of one's thinking. However, in many critical situations one cannot find a solution. The paper deals with the importance of teaching logic in mathematics for the human individual to be able to make ethically correct decisions. The mathematical formalism can simplify thinking and thus achieve the proper conclusion. Teaching logic can help humans learn the basic rules of logical reasoning. Mathematics is essentially a universal language of physics and technology but it can also be a language of communication in ethics. The unambiguity of mathematics could be used to solve many controversial ethical issues in the application of new scientific knowledge.

Keywords: *Logic, ethical decision making, a pupil, opinion.*

1. Introduction

Human beings are the only species that act rationally in a conscious way, are able to derive new knowledge from known ones, are able to anticipate and plan their actions. Rationality of man lies in the ability to think and act in ways that are led by logic. Logic is characterised as an analysis of methods used in human thinking or reasoning. It is necessary to develop the human ability to think. The school is the natural environment for the development of all aspects of the human personality, and, therefore, also of his thinking. Man in himself has the ability to think and he has the opportunity, and in a sense the obligation, to improve it during the educational process. Students should realise, with the help of a teacher that developing the ability to think logically is worth more for their future than just receiving information from individual subjects. Developing of thinking is the preparation for their future adult life, where they are expected to make responsible and correct decisions. These decisions are more or less connected to human being and carry within themselves an ethical dimension. Ethical decision-making process is based on the ability to assess conflict between two or more values of ethically relevant factors and, after careful consideration, choose the solution of the conflict. Every athlete spends a lot of time training that is, repeating the same activities. The athlete trains, because he knows that only diligent training is good preparation for the real game. School represents very important training for everyone. Every young person wants to be successful in his/her life. This should be a strong internal motivating force to spend time at school meaningfully. It means not only to receive information, but also to think over it. Young people, students, should be aware that if they spend time doing something with interest, they can achieve the best results. And this statement is true also in the case of mathematics. Its priority (given its abstractness) is to develop pupils' thinking. For example, Blais Pascal, at the age of 12, built the foundations of geometry with its own terminology. For a line he used the term stick, for a circle the term wheel. His father, a keen mathematician, took care of the son´s best mathematical education at that time. The son soon began to achieve excellent results. But Pascal departed from the science after the miraculous rescue of his life and he said about mathematics: "Mathematics is the most difficult job for the brain. I call it the most beautiful craft in the world, but after all it is only a craft. It's good for us to develop the force, but not to use that force" [1]. But he denies that claim by his own contribution to human progress. His brain was cultivated by mathematical means. He was a great humanist. He used his mathematical education to make human effort easier. He constructed a wheelbarrow, omnibus project, and as an 18-year old boy he constructed a calculating machine for finance officers in his father´s office. The example of this well-known not only mathematician can illustrate the impact of mathematics education to his way of thinking. He developed the strength not of muscles but of his mind thanks to the study

* [1]Dalibor Gonda, [2]Petr Emanovsky
[1]Department of Pedagogical Studies, Faculty of Humanities, University of Zilina, Slovakia
[2]Department of Algebra and Geometry, Faculty of Science, University of Palacky, Olomouc, Czech Republic
E-mail: daliborgonda@fhv.uniza.sk

of mathematics. He used the strength of his mind for the good of other people. Retrospectively, mathematics strongly influenced his ethical behaviour. The aim of this paper is not to be a guide of teaching mathematical logic. In the first part we focus on the potential contribution of mathematics to solving tasks that life itself brings us. Subsequently, in the second part we focus on the preventive role of mathematics to the most common errors leading to incorrect attitude or decision.

2. The contribution of mathematics when considering the problem

Everyone has already met with puzzles. An interesting thing is that although we know the text of the puzzle, often we do not remember its solution, even though we had already heard it. This fact can be used as an argument confirming the truism: "*Give* a *man* a *fish* and *you feed him* for a *day*; *teach* a *man* to *fish* and *you feed him* for a *lifetime.*" In our case, if we teach students to conclude correctly during the math course, we develop their ability to correct and independent decision making as well. Teaching logic can be based on solving the known puzzles. Our priority, however, will not be to solve the puzzle, but to focus on learning the correct thinking and reasoning in finding a solution. A puzzle will be used as an appropriate motivating factor. When solving logical puzzle, the teacher acts as a moderator in searching a solution.

Logic puzzle: The way out of the maze

We have been wandering through the maze a long time, we are tired and hungry. Our last hope is the two brothers at a crossroad. However, we can ask only one yes/no question. The problem is that one of them always tells the truth and the other is a notorious liar (always lies), and we do not know who is who. What question should we put to find out the way to the exit of the maze?

Solution: After setting the puzzle, students will suggest many solutions. We recommend the teacher to wait until the students exhaust all their solutions and afterwards the teacher can guide their thinking. First of all, the teacher turns their attention to the limit of puzzle setting: "We have only one yes/no question." All students´ questions that are not yes/no ones are incorrect. As with mathematical calculations also when reasoning there must be the solution in strict accordance with the puzzle setting. Finding the solution must start with puzzle set analysis. We do not know which brother is a liar and which is the truth-teller but both of them seem to know the way out of the maze. We need to find such a question to which the answer of any of the brothers will show us the way out. We look for the question, according to which we learn what we need, irrespective of which of the brothers will respond. Since we have only one question we cannot figure out which of the brothers is the truth-teller and which is the liar. The question must be focused on finding the right way out of the maze. One of such possible questions is: "What would your brother say if we asked him whether the right road leads out of the maze?"

The following is an analysis of the brothers' responses at a crossroad. The analysis will help us to validate the accuracy of the found solution. If we ask the truth-teller, he only reproduces the incorrect answer of his brother "liar". So his answer would have marked the right way incorrect. If we asked the liar, he would have "distorted" his brother answer and indeed he would mark the right way as incorrect. Both brothers mark the right way as incorrect, therefore, it does not matter which brother we ask our question. After their answer we know that we must move in the opposite direction to the right direction according to the brothers.

To find the right solution (the question for both brothers) and to watch the validation of question correctness is demanding for most students and not only for them. We often hear the sentence: "I got lost!" This situation, in the introduction of the teaching of logic, can be used to define the basic concepts of propositional logic – proposition, negation, the true value of proposition, propositional form. The use of those terms will help us to solve the puzzle "mathematically". Mathematisation lies in the fact that the individual thought processes are written symbolically. The task solution will be, in fact, "illustrated".

At the beginning, we agree that the way to the left leads out of the maze (brothers know about it, but we do not). The replies of the truth-teller will be indicated by the symbol, the liar´s responses by symbol. What would be the outcome after a natural question?

Does the way to the left lead out of the maze?

We can see that the question will not help us to get out of the maze, because the truth value of the brothers´ replies depends on which one we ask. We would get such different responses (and their truth values) to the question: *Does the way to the right lead out of the maze?* We, however, look for such a question, where would be true for the truth values. Our task is to change the question as to alter the truth value of only one of the statements or. It is not intended to change the answer of one of them, but to change the truth value of reply of one of them. To solve the puzzle we need to realise that truth-teller repeats the answer of his brother without any change and the liar tells us the opposite of what his brother would say. The liar negates his brother´s answer, so that he will also change its truth value. After the question

What would your brother say if we asked him if the way to the left leads out of the maze?

we get the following result

It is clear from the scheme that we have found the right question. Its truth value is independent of which brother responds. At the same time we can see the response of the two brothers has the truth value 0, because the truth value of the answer is determined by the way out of the maze. Therefore, we must do the opposite as we were said, we will use the way to the left. In the end, on the defence of the truth-teller, we need to say that he

does not deceive us, just repeats the answer of his brother. On the contrary, if his brother's answer changed from false to true, then he would deceive us.

We think that the solution of the logical puzzle is a viable way how to "peacefully" bring students into mathematical consideration. "Mathematical" solution is in itself an important element of illustration. Significant results of considerations are clearly shown and we can return to them at any time, without re-reading connected text. At the same time there is no need to remember the whole train of thought of the solution. Our attention in the "mathematical" solution was drawn to the truth value of brothers' ´replies.

We just edited the question so that we will get the desired truth value of brothers´ response. The students will acknowledge that the introduction of mathematics simplified and clarified the puzzle solving. Students find it surprising that the very question that should be the solution of the puzzle in "mathematical" thinking is not assessed. We do not pay primary attention to it, because it is not a proposition. The question is only edited and the brothers´ replies, that are propositions, are examined.

It is known that propositional logic deals with reasoning depending only on truth values of propositions, leaving the internal structure of the propositions out of account. This approach can be quite difficult for students. Their thinking is shifting to a higher level. Propositional logic gives us some scheme that allows us to navigate easier when deciding about the correctness or incorrectness of a proposition. Students learn that when they decide for something it is not always essential who and how to say it. It is often essential what the truth value of elementary propositions that compose a proposition is. In this way, students are trained to cope with different ideologies.

3. A healthy common sense is not always enough

In general, mathematics is considered the least favourite subject, and the propositional logic the least popular thematic unit. Mathematics and the propositional logic too, are often reputed to be out of students´ lives. They often ask: "What do I need it for, when will I use it in my life?" It is hard to convince them that they will use in life the truth value of the proposition

If it is raining, then the car is green.

We suppose that in teaching any of the themes it is necessary to keep the detached view and keep in mind the main objective of teaching mathematics - development of logical thinking. Especially in teaching logic there is the space to convince students about the need to develop their ability to consider properly and make decisions. First of all, it is necessary to convince students that it is possible to learn how to think logically. Prerequisite for learning logic is a spontaneous person's ability to think in accordance with certain rules and laws. Each person must in one's life think over what they hear and evaluate whether it is true or not. One will often draw new knowledge based on the obtained "information". Every person has to make a lot of vital decisions and everyone wants to make correct decision [2]. Teaching logic (and mathematics itself) is not a challenge for students to deal with something new. On the contrary, it is a challenge for a new perspective of their daily activities. It's an offer to make finding the right decisions easier. Everyone has the ability to think. Like any other ability, also the ability to think can be developed by training, in this case by thinking. If, within training, the new elements are added, thinking shifts to the next level. Thus, if students involve mathematical elements into their way of thinking, it can be simplified and clarified. As an analogy we can mention a person walking on the ice. Walking on the ice is more demanding than walking on dry land but it is still possible. Over time, training and considering what to do to improve, one learns that it is necessary to make small steps and walk more slowly. If we give a person skates, this person will not believe that the skates are more convenient for walking on the ice than normal shoes. But this individual will be getting better at skating so he will realise that skating is common activity for him. And at the same time it will become clear that skating is a more convenient way to move on the ice. In the end we would like to note that the skates are the result of thinking of their discoverer about the options for a better movement on the ice. As we can walk down on the ice in shoes, so we can also engage in intellectuall reflection. But it would be possible to improve our thinking, to move to a higher qualitative level of teaching logic in mathematics.

One does not like to let anybody to interfere in his/her internal world. Students often use the counter-arguments, the sufficiency of the quality of their thinking. They say "the common sense is enough for me." The common sense can be considered as reflection on the observation of laws around the world and events around us. In a sense this is a natural logical intuition, and one makes one's judgments and decisions based on this intuition. But in many critical situations, common sense cannot find a solution and even can offer the wrong solutions [3]. For example, the observation of man leads to the following statement

If a subject moves, it means there is a force having an effect on it.

Isaac Newton, however, claims that a subject can move without the application of external force and in uniform rectilinear movement.

We face two opposing arguments concerning the same subject. Can both be true? Basically, we come to the problem: everyone is right. We suppose it is a serious problem that undermines human relationships in society and even within families. "Everyone has one's own truth" is a phenomenon that divides society and often also causes family breakdown. A law of negating a logical dispute should be instilled in students during logic lessons: **two contradictory claims, concerning the same subject matter, cannot be true simultaneously**. In this way students will know that in this case it is necessary to seek the truth. The

situation will not divide the participants. Instead, it becomes an invitation to a common search for truth. A joint effort connects. In the first year of secondary school students still do not make many important decisions. But school is (should be) a preparation for life, it should be beneficial to further improvements of future life. Each of the students will have to do a lot of judgments and decisions and their quality, to a significant extent, depends on the contribution of the logic teaching and mathematics in general [4]. The students should take an important lesson from logic teaching: the **truth is only one and does not depend on me**. This brings us to the ethical dimension of decision making process.

Of course, it is possible to say a lot of compatible arguments about the same thing, e.g. .:

The dog is small. The dog is black. The dog is young.

These arguments are logically consistent, because there may be a small, black, young dog. Even these arguments are logically consistent:

It seems to me that the dog is black. It seems to me that the dog is brown.

The two statements can be true and it does not concern the colour of the dog but if a person finds it true or not. In such examples, the students learn that before they consider whether someone is telling the truth or lying, firstly it is necessary to consider what the person wants to say. There is a big difference if someone says:

It seems to me that the task is solved correctly. (1)

or says:

That task is solved correctly. (2)

The veracity of the first statement (1) does not depend on whether the task is solved correctly or incorrectly. The second statement (2) is true only if the task is solved correctly.

The students should gradually realise that judgments are formed from the opinions and the opinions are made up of concepts. The concepts are represented by words that are the cornerstone of our expressing, as well as the source of many errors. These errors are due to the fact that there may be confusion of concepts that are expressed by the same or very similar words. This is a homonymy. Homonyms may be the seeds of many logical errors as well as disputes between people. These errors can be prevented when both sides hearing the same words think about the same concepts. Correct and accurate defining of concepts, which are being discussed, can limit to a large degree the amount of unnecessary misunderstandings. And this is the big role of mathematics as an exact science. From learning mathematics, students take the knowledge that a fair solution of the problem must be based on the precise definitions of (mathematical) concepts. In this context, the confusion of the term (the word) with what it means is not always detectable mistake [5]. The known sophism illustrates it:

If you say something, it goes through your mouth. Are you talking about the car, so the car is going through your mouth.

In the sophism there is apparent word confusion (and what the word refers to). This kind of errors in reasoning, however, becomes less clear, if a mentioned subject is highly abstract. In the study of geometry we often identify a sign of point (e.g. on the blackboard, in the workbook, etc.) with a point itself. A sign of point has non-zero size but the point in geometry is dimensionless. A sign of point was arranged at the request for graphicness that the interpretation of the curriculum was not just in the abstract level. It should be mentioned that the concepts have different names in different languages, and these names were essentially attributed to them by the concept "agreement". When we learn a foreign language we do not learn the new concepts. The concepts, which we already have created, are only assigned the common names in a particular language. Similarly, it is almost the same when learning mathematics. Already known concepts are assigned the mathematical symbols, we do mathematical operations with the already known concepts.

Another source of logical errors, thus misunderstanding and disputes too, is the failure to differentiate between concepts and objects that fall under these objects. Such errors are made frequently in everyday life situations. The concept is an abstracted and generalised form of objective reality by thinking. It should be understood that the dog is only the concept in our mind. Realistically there is only a concrete dog as an object. A dog would not protect us from thieves. But the dog, which we have at home, would. At the same time it is necessary to teach students to distinguish between the content of the concept (set of features) and range of the concept (subjects that fall under the concept). The students should be alerted about the existence of content-empty concepts. Content-empty concepts exist because they are logically questionable (square circle) or imaginary (gingerbread house) or they represent ideal objects (absolutely black body). Although they are content-empty, it is possible to work with them in reasoning and even in science – absolutely black body in physics. Mathematics is regarded as a purely abstract science. But from the text described above it can be seen that our ordinary speech in its abstractness does not lag behind mathematics [6].

In reasoning, there is an important role of images that are linked with the concepts. Each idea is a unique psychic act. A person creates his own image about the concept. When you say the word "dog" not everyone imagines the same dog. These concepts are subjective in nature and as a whole are impossible to talk about. As people are different so are their ideas. In contrast, the concepts are not owned by individual people. The terms do not change according to the fact that they are recognised by people. They are outside our thinking. One can even say that the concepts have their logical existence, irrespective of whether someone thinks them or get to know them. Prejudices are closely linked with the images connected to the concepts. Then these prejudices can influence human behaviour to their surroundings. It is sufficient for a child to have a negative experience with a dentist and for years the concept of a dentist will be associated

with the concept of pain. On the basis of prejudice, we can all, falling within the concept, "lump together". A belief can be developed from the prejudice, and such belief will direct our decision at the wrong direction. Many ideologies work this way. First, they create the prejudice against a certain group of people and later the conviction that they are the enemy. A person can manage to defend oneself, but only if one retains the ability of independent and free thinking that was conscientiously developed during one's student days.

4. Conclusion

Mathematics is often considered the queen of all sciences. We think the queen is good only if it is there for all and serves all. During teaching logic, there is a large space for the formation of a correct students' attitude towards mathematics. If they realise that they do not learn mathematics to know how to solve the complex equations, but the real reason for learning mathematics is that it will assist them in dealing with life's challenges. This point of view will change their attitude towards mathematics. Thanks to mathematics their daily activity – thinking, becomes a more efficient and more accurate activity. They realise that an advanced thinking causes that they know much more than they have learned. They are capable of drawing new findings from already acquired knowledge. They will be able to answer the questions that even lead away from that knowledge. They will have the ability and the courage to express their opinions and at the same time will be able to defend their views with the right arguments. Advanced thinking as the result of learning mathematics gives students the opportunity to retain freedom of thoughts and making decisions in adulthood. Nowadays, young people quite often postpone important decisions (choice of college, marriage, and parenthood) for later or have others make them for them. In accordance with moral determinism they try to choose the greater good of the alternative options. They postpone making decisions, they do not know on what basis they have to decide. They face the danger of "Buridan donkey", which died of starvation between two identical hay piles, wondering which was better. The students know from the maths classes that the task can have more solutions and all solutions are equal. But they learn something more. Although the two sub-tasks have equivalent solutions, their use in the search for general solutions may lead to different results. One of them can be more acceptable to us than the other. Thus, having a look "into the future" will help us to choose the equivalent options the one that leads us to the most desired solution. Mathematics serves man perfecting his daily activities - thinking and decision making. If we can instil this belief in students mind, they will be willing to train their mind in mathematics classes and also make courageous, therefore, correct ethical decisions in adulthood.

References

[1] ZNAM, S. et al.: *View into the History of Mathematics* (in Slovak), Alfa : Bratislava, ISBN 978-80-87053-16-4, 1986.
[2] TUREK, I.: *Didactics* (in Slovak), Iura Edition : Bratislava, ISBN 978-80-8078-198-9, 2008.
[3] GAHER, F.: *Logic for Everybody*, IRIS : Bratislava, ISBN 80-89018-54-8, 2003.
[4] ZELINA, M., ZELINOVA, M.: *Development of Creativity of Children´s and Youth´s* (in Slovak), Bratislava : SPN, ISBN 80-08-00442-8, 1990.
[5] FULIER, J., SEDIVY, O.: *Motivation and Creativity in Mathematical Education* (in Slovak), Prirodovedec : Nitra : FPV UKF, ISBN 80-8050-418-0, 2001.
[6] HEJNY, M. et al.: *Theory of Mathematical Education II* (in Slovak), SPN : Bratislava, ISBN 80-08- 00014 -7, 1989.

Pavel Kopecek - Milan Pinte - Michal Sasiadek - Muhammad Latif*

USING TWO STACKERS ON ONE RAIL IN A PRODUCTION SYSTEM

This paper deals with the possibilities for using two stackers for interoperation transport in a workshop with a technological layout of workplaces. Basic layouts of stacker production systems are discussed. Several strategies for selecting and ordering transport demands in systems with two stackers on one rail have been simulated and evaluated. FIFO strategies are the worst in various layouts of workplaces. On the other hand, the strategy of the choice of the proximate transport demand is simple and very successful. Good technological layout can enhance transport performance.

Keywords: *Stacker, material supply, production system, automated transport, optimization, two cooperating stackers.*

1. Introduction

The rapid progress of electronics, computer science and communication enables economic automation of production processes not only in large series production such as in the automotive industry, but also in piece and low series production, where the technological organization of production does not allow the use of conveyor-belts. The material flow in such production systems is controlled by routings. Transport systems in such production centres should meet two main demands:

- Transfer of material and/or pallets among workplaces and material and tools preparation room;
- Stocking of pallets waiting for operations.

The paper [1] describes an overview of the means of transport.

There are two main automatic transport systems:

- Inductive controlled carts or trains
- Stackers with high racks

The main advantage of inductive carts is that they do not need large structural changes in a workshop, as they do not need rails or barriers for movement of persons in the workshop. The changes in the workshop layout are relatively simple. A breakdown of one cart does not affect production.

The disadvantage of inductive carts is a low inter store capacity.

Stackers unfortunately divide a production center into two halves, and high racks need to be built; but the transport system fulfils not only transport demands but also serves as a middle operation store. Changes in the workshop layout are very difficult, perhaps impossible. The breakdown of a stacker could create big problems in production.

The combination of a stacker storing system and a storage conveyor is mentioned in [2]. The conveyor could be altered by inductive controlled carts or rail guided vehicles.

2. Basic layouts of stacker production systems

One stacker, racks and workplaces on both sides

Workplaces in the production centre are situated on both sides of the racks. A stacker works in the aisle between the racks (Fig. 1).

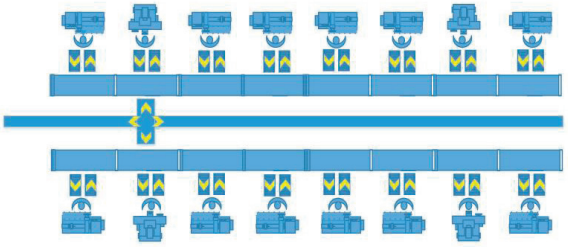


Fig. 1 One stacker, racks and workplaces on both sides

* [1]Pavel Kopecek, [1]Milan Pinte, [2]Michal Sasiadek, [3]Muhammad Latif
[1]University of West Bohemia, Faculty of Mechanical Engineering, Czech Republic
[2]University of Zielona Gora, Poland
[3]School of Engineering, Manchester Metropolitan University, United Kingdom
E-mail: pinte@fst.zcu.cz

If the capacity of the stacker is not sufficient, the production system can be divided into two centres (each with one stacker], or the stacker must be doubled. It is possible to double stackers in three ways:

- Adding one middle rack and using two stackers, each in its own aisle.
- Enlarging the aisle, adding another rail near the former one and using stackers with asymmetric working forks.
- Adding another stacker on the same rail as the former one.

These solutions have many advantages and disadvantages.

Two stackers, racks on both sides with a middle rack, two aisles with one rail and workplaces on both sides of racks

This solution (Fig. 2) is very simple and rapidly increases the capacity both of transport and of storage. If the layout of workplaces on both sides of the racks is designed well (replaceable workplaces always on one side, and the capacity of racks is satisfactory), the capacity can double. The difficulties with the breakdown of one stacker remain (at least one side of the centre must wait), but they are lowered.

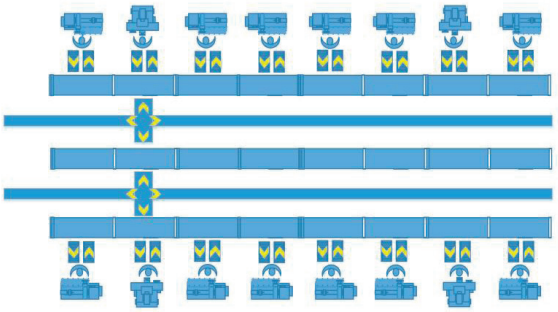


Fig. 2 Two stackers, racks on both sides, a middle rack, two aisles with one rail and workplaces on both sides of racks

Two stackers, a wider aisle, two rails close together and workplaces on both sides of racks

This solution for a Storage/Retrieval system (Fig. 3) was published in [3] with methods for how to coordinate these two stackers to prevent collisions. Stackers must pass by at different heights, cannot operate with forks on the same length positions and nearby. The shift out of the fork must reach both racks asymmetrically. The control algorithm is difficult, because the control systems of both stackers are not independent. The risk of collision by faulty sensors cannot be eliminated. On the other hand, if one stacker breaks down, the other could continue to work, while the first one waits in a parking position for service.

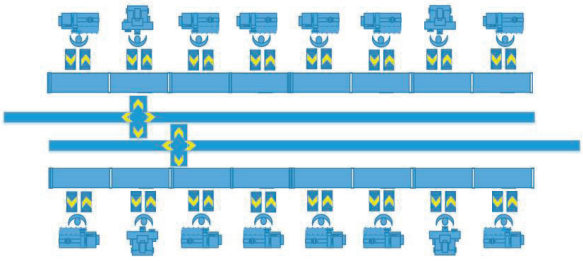


Fig. 3 Two stackers, a wider aisle, two rails close together and workplaces on both sides of racks

Two stackers on one rail, one aisle, two racks and workplaces on both sides

The solution is shown in Fig. 4. There is a minimum safety distance between stackers. A stacker in a parking position does not influence the other. If one stacker breaks down, the other one can continue to work, while the first one waits in a parking position for service. The control systems of both stackers are independent, there are only simple sensors detecting the minimum distance between stackers and changing the velocity in emergency to micro move.

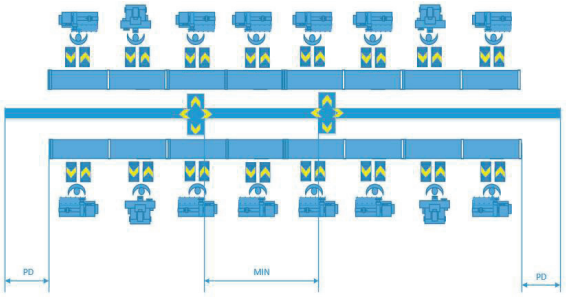


Fig. 4 Two stackers on one rail, one aisle, two racks and workplaces on both sides

3. Optimization of the system with two stackers on one rail

The most important question to be answered for optimization is the optimization criterion. Transport demands (start and end of each transport) are fixed. Losses are motions between the momentary position of the stacker and any start of transport. The criterion can then be the sum of the motion of the empty stackers or the total time of the execution of all given transport (makespan).

There are three levels of optimization:

1. Layout of the workplaces, so that e.g. workplaces from the beginning of the routing are on the left side, from the end

are on the right side and workplaces more used at different positions in the routing (checking and measuring) are in the middle. Thus transport demands for long distances are reduced.

2. When searching for a free place in the racks, use of the "nearest place first" strategy (near can mean near to the input of a pallet in the transport system or near to the next workplace).
3. For a given set of demands, find an optimal order of demands for both stackers.

The first level should be implemented during the workshop layout proposal stage, and this proposal can be changed only with great difficulty.

The second level is simple to implement when generating a new transport demand after the signal "store in". Some problems could occur in the strategy "near to next workplace", when there are more possible (changeable) workplaces in the routing and they are placed far from each other.

The third level is the topic of this paper.

4. Optimization possibilities

As mentioned in [4], the optimal order of transport demands for one stacker is a NP problem. It is possible to find a solution by "brute force" only for a small number of demands (say 10). On the other hand, the "nearest demand first" algorithm is simple and the more demands it solves, the better are the results obtained.

This paper deals with "ad hoc" optimization strategies. Better methods for simulation optimization are discussed in [5]. Unfortunately, these methods are very sophisticated and time consuming and also need accurate production data.

The goal of the research was to prove that two stackers with a simple strategy could better solve both the increase of transport capacity and the reliability of the production system.

5. Optimization experiments

If both stackers are free, one of them is chosen randomly. If a stacker is free, a demand which does not have a planned collision

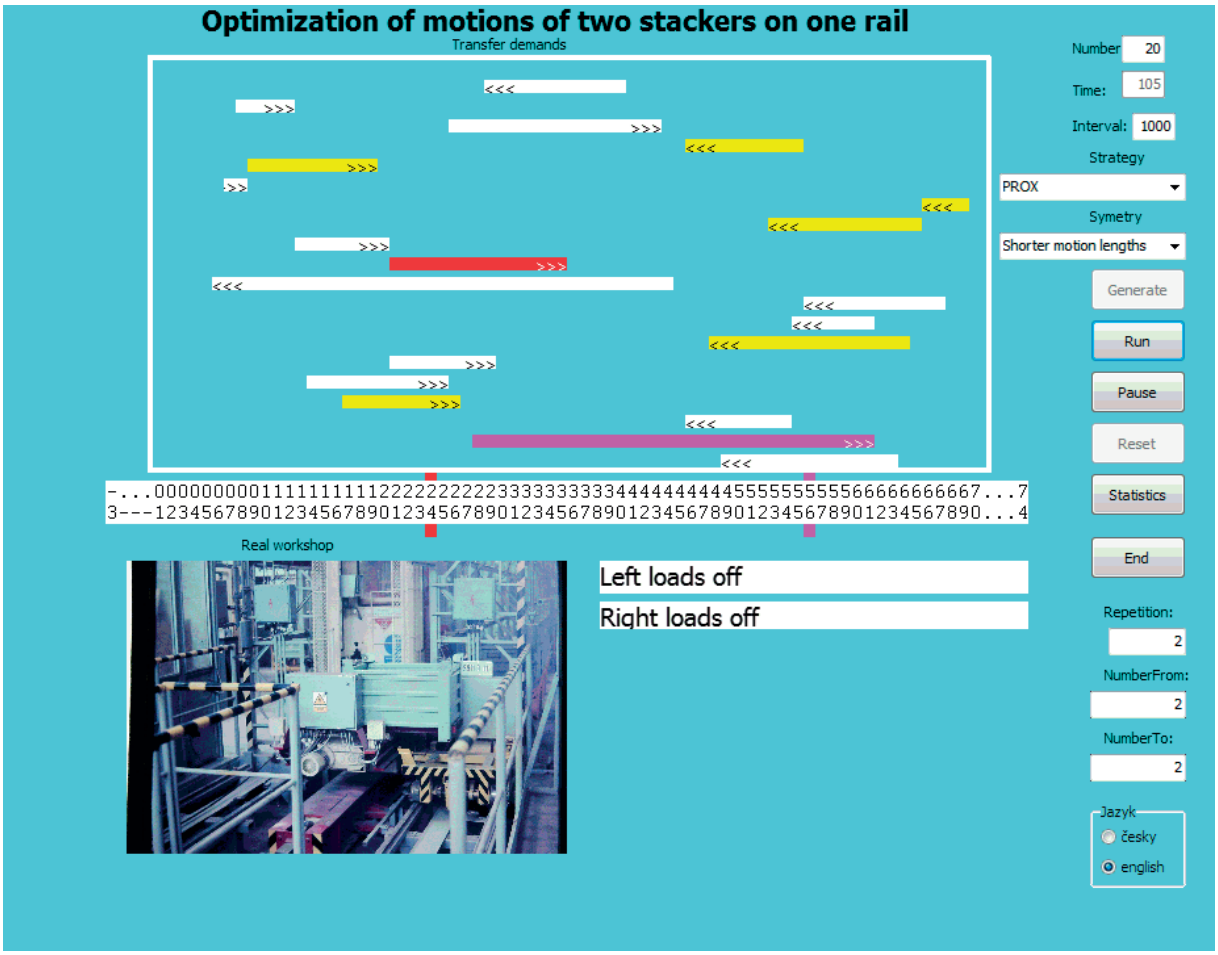


Fig. 5 Simulation program

with the position of the other or with a movement of the other one is chosen.

Five ad hoc algorithms were tested (5 strategies):

1. FIFO: First demand fulfilling above mentioned condition is chosen.
2. PROX: The proximate demand fulfilling above mentioned condition is chosen.
3. BEST LEFT OR RIGHT: For the left stacker the most left ending demand is chosen, and for the right stacker the most right one.
4. COMB: Combination of NEAR and BEST LEFT OR RIGHT.
5. PROX and PAIRS: If both stackers are free, the pair with the sum of proximate starts is chosen.

The solution with only one stacker (the other one waits in the parking position in the state of breakdown) and the solution with both stackers were tested for each strategy.

One series of demands was tested with regular distribution of probability (every start and end position of any demand has the same probability, and neither optimization of workplace layout nor "nearest" strategy by finding a free place is used). The second series of demands regards layout and "near free place" strategy through shortening of lengths of 2/3 of demands to 50%.

The number of demands varies from 2 to 20.

Experiments were very time demanding. Parallel computers have to be used. Each attempt is repeated 50 times. More repetitions did not generate more accurate results. Thus 5 700 lines of results were obtained and transformed into graphs.

The program testing of the results from all the cases above was done with the animation of stacker motions and the possibility to accelerate or slow down the animation. The layout of the test program is shown in Fig. 5.

6. Results and discussion

Results of simulation are shown in Figs. 6 and 7.

Strategies "BEST LEFT OR RIGHT" and "COMB" are much better than FIFO, but not as good as the strategy "NEAR". "PROX and PAIRS" is also better than "PROX" but not much. For better clarity, they are not shown in Figs. 6 and 7.

Figure 6 shows the regular distribution of probability for all generated starts and ends of transfers. The blue line (1-0) shows strategy "FIFO" with only one stacker, the red line (1-1) shows strategy "NEAR", the green line (2-1) shows strategy "FIFO" for two stackers and the violet line (2-2) shows strategy "NEAR" for two stackers.

While one stacker with the FIFO strategy has fast, constant results (variations are only caused by the number of repetitions in the simulation), two stackers have better results (shorter manipulation times) for more demands. With this strategy, there is in practice no difference between two stackers with "FIFO" and one stacker with "NEAR".

Figure 7 shows transfers with regular distribution of probability for all generated starts and with shorter lengths of transport. The model on Fig. 7 should better cover the situation when the layout of the workplaces and the strategy of searching for free places in the racks are optimized. In this case the "NEAR" strategy is by far the best of all the strategies.

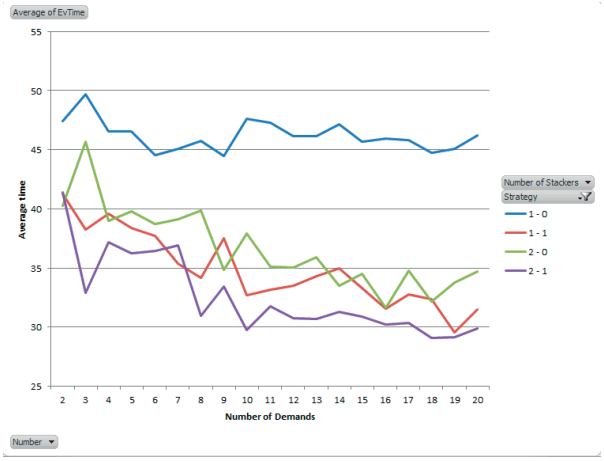


Fig. 6 Average time of one transport with regular distribution of starts and ends of any

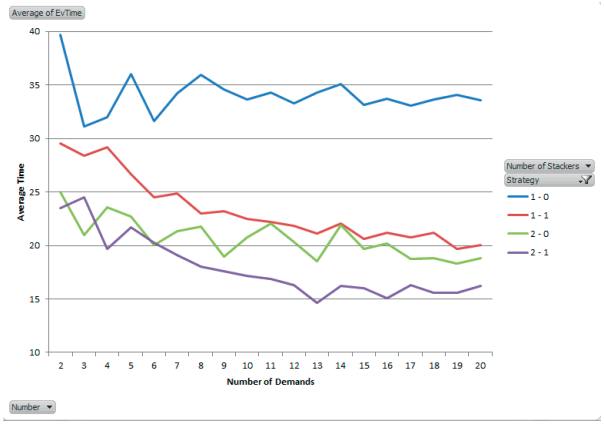


Fig. 7 Average time of one transport with regular distribution of starts of any transport and shortened lengths of transports

7. Conclusion

Though this paper describes only some ad hoc optimization algorithms, the results can be used in the design of new manufacturing systems for piece and low series production. Further research could focus on building optimal couples and using methods of simulation optimization [5], but sophisticated algorithms need accurate data and minimum disturbances in the real workshop, which cannot be guaranteed.

Acknowledgment

The project presented in this article is supported by the project SGS-2015-065 (Development of parameters of a sustainable production system).

Results from the project OP VK n. CZ.1.07/2.3.00/09.0163 have been used.

References

[1] HALL, R. W.: The Architecture of Transportation Systems, *Transpn. Res. C*, vol. No. 3, pp. 129-142, Elsevier Science, 1995.
[2] LEE, S. G., DE SOUZA, R., ONG, E. K.: Simulation Modelling of a Narrow Aisle Automated Storage and Retrieval System (As/Ds) Serviced by Rail/Guided Vehicles, *Computers in Industry*, 30, 1996, pp. 241-253, Elsevier, 1996.
[3] KUNG, Z., KOBAYASHI, Y., OTA, J.: *Motion Planning of Two Stackers Cranes in a Large/Scale Automated Storage/Retrieval System,* Proc. of the 2011 IEEE Intern. conference on Robotics and Biomechanics, December, 2011, Phuket, Thailand.
[4] KOPECEK, P., PINTE, M.: Optimization Heuristics for Supplies of Assembly Lines, *Periodica Polytechnica Transportation Engineering*, 2014, No. 1, pp. 49-52.
[5] RASKA, P., ULRYCH, Z.: *Simulation Optimization in Manufacturing Systems*, 'Annals of DAAAM for 2012 & Proc. of the 23rd Intern. DAAAM Symposium' (ed.: Katalinic B.), DAAAM International, Vienna, 221- 224 (2012).

COMMUNICATIONS – Scientific Letters of the University of Zilina
Writer's Guidelines

1. Submitted papers must be unpublished and must not be currently under review for any other publication.
2. Submitted manuscripts should not exceed 8 pages including figures and graphs (in Microsoft WORD – format A4, Times Roman size 12, page margins 2.5 cm).
3. Manuscripts written in good English must include abstract and keywords also written in English. The abstract should not exceed 10 lines.
4. Submission should be sent by e-mail – as an attachment – to the following address: komunikacie@uniza.sk (or on CD to the following address: Zilinska univerzita, OVaV – Komunikacie, Univerzitna 1, SK – 010 26 Zilina, Slovakia).
5. Uncommon abbreviations must be defined the first time they are used in the text.
6. Figures, graphs and diagrams, if not processed in Microsoft WORD, must be sent in electronic form (as JPG, GIF, TIF, TTF or BMP files) or drawn in high contrast on white paper. Photographs for publication must be either contrastive or on a slide.
7. The numbered reference citation within text should be enclosed in square brackets - in numerical order. The reference list should appear at the end of the article (in compliance with ISO 690).
8. The numbered figures and tables must be also included in text.
9. The author's exact mailing address, full names, E-mail address, telephone or fax number, the name and address of the organization and workplace (also written in English) must be enclosed.
10. The editorial board will assess the submitted paper in its following session. If the manuscript is accepted for publication, it will be sent to peer review and language correction. After reviewing and incorporating the editor's comments, the final draft (before printing) will be sent to authors for final review and minor adjustments
11. Submission deadlines are: September 30, December 31, March 31 and June 30.

COMMUNICATIONS

SCIENTIFIC LETTERS OF THE UNIVERSITY OF ZILINA
VOLUME 19

Address of the editorial office:
Zilinská univerzita
Office for Science and Research
(OVaV)
Univerzitna 1
SK 010 26 Zilina
Slovakia

E-mail: komunikacie@uniza.sk

Each paper was reviewed by two reviewers.

Journal is excerpted in **COMPENDEX** and **SCOPUS**.

It is published by the University of Zilina in
EDIS – Publishing Institution of Zilina University
Registered No: EV 3672/09
ISSN 1335-4205

Published quarterly

Single issues of the journal can be found on:
http://www.uniza.sk/komunikacie

ICO 00397 563
January 2017