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THE ROMANIAN COMMITTEE FOR THE HISTORY AND PHILOSOPHY OF SCIENCE AND TECHNOLOGY – A RETROSPECTIVE IN THE ANNIVERSARY YEAR OF THE NOESIS JOURNAL

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Abstract: The year 2023 marks 50 years since the appearance of the first issue of Noesis magazine, as the representative publication of the Romanian Committee for History and Philosophy of Science and Technology (CRIFST) of the Romanian Academy. This article analyzes the conditions under which the CRIFST was created within the Romanian Academy and the contribution of some great personalities from Romania in establishment and development of the discipline of history and philosophy of science and technology. It is shown that after 1955, internal and external conditions became favorable for extension of cooperation between the Romanian Academy and international bodies in the field of history and philosophy of science. Thus, in 1956/1957, the Romanian Committee for History and Philosophy of Science (CRIFS) of the Romanian Academy was established to promote the disciplines of history and philosophy of science and for cooperation with international bodies in the field. A new reorganization of CRIFS took place after the historical year 1989, when CRIFS became CRIFST, including technology as a field of study. Significant Romanian contributions of the CRIFS/ CRIFST's cooperation with IUHPST/DLMPST and IUHPST/DHST are detailed. There are highlighted the conditions in which the first issue of Noesis journal as an annual periodical publication of CRIFS appeared in 1973 and continues to be published today as the CRIFST publication.

Keywords: history of science, history of philosophy of science, history of technology, Romanian Committee for History and Philosophy of Science and Technology, NOESIS magazine history.

INTRODUCTION

The year 2023 marks 50 years since the appearance of the first issue of NOESIS journal, as the representative publication of the Romanian Committee for History and Philosophy of Science and Technology (CRIFST) of the Romanian Academy. It is the year marked by multiple anniversaries for personalities and institutions that contributed to Romania's progress towards democracy and progress in the knowledge of the world and of man himself.

NOESIS journal would not have been published if, during the years after the Second World War, the actions carried out by brave people with a desire for justice and freedom had not faced the events that followed.

As a study discipline, the History of Sciences is at the junction between the History and Scientific Knowledge, being, like them, under the dominance of historical and physical time. Thus, for the compilation of a history of the sciences, it was naturally necessary to accumulate a wide variety of scientific research works for each of the branches of science and technology. The history of science could not shed light on the evolution of science without deciphering how technology propels progress in mankind culture and civilization (Maliţa 1998).

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In many countries, the history of science and the history of technology have become independent disciplines. Fewer ways have been found for interdisciplinary studies, which would highlight the creative evolution of the human mind.

In Romania, studies and research in this field began to be developed under the auspices of the Romanian Academy, since the last part of the last century. The members of the Academy, the researchers from the institutes under its patronage and specialists from other institutions, were involved in their activities and the research of many aspects related to the history and philosophy of science and technology (Balan 1984).

However, the need for the development of this study discipline was felt only after the 1950s, the leading promoter being the CRIFST of the Romanian Academy, established in 1956/1957.

But, there are still many issues that require clarifications: How did collaboration work during the Cold War? How was it possible to organize scientific congresses, where such urgent topics were addressed: science and technology for the prosperity of human society?

This article will analyze the conditions under which the CRIFST was created within the Romanian Academy, the contribution of CRIFST and how famous personalities from Romania acted to establish the history and philosophy of science and technology as a discipline of standing self, to round the image of man as *Homo Militans* & *Homo Philosiphans* & *Homo Scientifer* & *Homo Technicus Technologicus*.

PREMISES FOR AFFIRMING THE DISCIPLINE OF HISTORY AND PHILOSOPHY OF SCIENCE AND TECHNOLOGY IN ROMANIA

Several factors have hindered the development and affirmation of a history of science and technology in Romania, conditions that have manifested themselves similarly in most Eastern European countries.

The end of the Second World War marked the beginning of the process of establishing communist regimes in Eastern Europe, with new confrontations that led to the outbreak of the Cold War (Iacob–2009). The Cold War was expressed not only through the economic competition between the two systems – capitalist and socialist, but also through a strong ideological and propaganda struggle, in which the promotion of collaborative relations was prevented.

Internally, the difficulties of asserting the discipline of history and philosophy of science were related to the stages of "institutional reform" experienced by the Romanian Academy. An analysis of the stages passed by the Romanian Academy during the beginning of the communist era highlights the complex process of destruction-reconstruction, change-continuity, which took place at the institutional level in the entire higher education system in Romania and which culminated with the one held at the highest scientific and cultural forum of the country. The crucial points were the year 1948 when the Academy was transformed into a state institution, politically enslaved, and the year 1955, when the institution reoriented itself

towards the "planning of science and research", and then the orientation towards „national turn". After the period of terror directed by the state against the majority of its citizens from 1948–1955, in 1964–1965 a process of reconstructing the nation began, with the reconsideration of tradition within the Romanian Academy. But the reconstruction process, after the 1970ˢ, eased, with the emergence of major difficulties in communication and collaboration (Iacob 2009; Maliţa 2007; Berindei 2006).

However, the establishment immediately after the end of the Second World War of the United Nations Organization (UNO), with a main component of UNESCO, having as its objectives the peace keeping, international cooperation and respect for human rights, was the main element in achieving stability in Europe (Haas 2020), The application for Romania membership was submitted only in 1955, on December 14, and the approval came in 1956 (Maliţa 2007).

In fact, scientific research knows no borders. Cooperation between researchers did not stop during this period. There was cooperation, even if they were of a limited nature. Contacts were maintained, congresses and international meetings were organized, despite the control or pressure of the governments. In certain cases, collaborations have multiplied, and some of them have been institutionalized. This is also the case of the CRIFST of the Romanian Academy, which was established and operated for a long time during the Cold War, to promote the history and philosophy of science and technology.

Despite all the impediments, after the Second World War, opportunities for collaboration increased through the establishment and activity of international bodies and institutions specific to the field of science, techniques, including their history.

A synthetic situation of the development of international bodies in the field of history and philosophy of science and technology is shown in Figure 1. In this figure it pointed also the Romania's cooperation dynamics with international bodies in the field of history and philosophy of science and technology.

THE ESTABLISHMENT AND AFFIRMATION OF CRIFS,
WHICH BECAME CRIFST AFTER 2002

In the years 1956–1957, conditions were created for the establishment of the Romanian Committee for the History and Philosophy of Science (CRIFS) by the Academy of the Popular Republic of Romania.

The chronology of the actions for the establishment and affirmation of CRIFS is mentioned below (Analele Academiei Române 1955–1957; Balan 1984):

● April 11, 1956 – The Office of the Presidium of the Romanian Academy decides to start the process of affiliation of the Romanian Academy to the International Union of the History of Science. In order to connect to the objectives of the International Union for the History of Science (IUHS), the president of the Romanian Academy, academician Traian Săvulescu proposes the establishment of the Romanian Committee for the History and Philosophy of Science. In this sense, it was requested that each section of the Romanian Academy propose a representative personality in this Committee.

International cooperation dynamics			Romania's cooperation dynamics
The approval of the name change of DLMPS to DLMPST and of IUHPS to IUHPST, at the IUHPS/DLMPS Congress in Helsinki	2015		Continuation of CRIFST activity in the two divisions DHT and DLMPST of IUHPST
		2014	Organization of the ICOHTEC Symposium, in Brasov
The name change of DHS to DHST, at the IUHPS/DHS Congress in Beijing	2005		
The IUHPS/DHS and IUHPS/DLMPS congresses are organized alternately, every two years. ICOHTEC symposia are organized every two years, then annually		2002	Reorganization of CRIFS which becomes CRIFST, with three divisions: DLMPS, DHS, DHT
		1981	Organization of the IUHPS/DHS Congress in Bucharest
		1973	The first issue of NOESIS journal
		1971	Organization of the IUHPS/DLMPS Congress, in Bucharest
The first ICOHTEC symposium in Pont-a-Mousson (France)	1970	1970	From this year, Romania participates in all symposia organized by ICOHTEC
The establishment of ICOHTEC at the IUHPS/DHT Congress in Paris	1968		
		1962	Romania joint IUHPS/DLMPS
		1957	Romania joint IUHPS/DHS
		1956	The establishment of CRIFS
Merger of IUHS with IUPS and IUHPS affiliation with ICSU		1955	Romania's accession to UNESCO
		1954	Petre Sergescu has sustained activity in AIHS and IUHS, as vice-president of AIHS (1937-1947), president of AIHS (1947-1950) and secrétaire perpétuel from 1950 until his death in Dec. 1954
IUPS is established	1949		
IUHS is established	1947		
The establishment of the UNO, UNESCO and ICSU	1945		
		1932	The second congress of Romanian Mathematicians, in Turnu Severin
The First Congress of the History of Science, in Paris	1929	1929	The First Congress of Romanian Mathematicians, in Cluj
The establishment of AIHS, in Paris	1928		

Figure 1. Dynamics of Romania's collaboration with international bodies in the field of History and Philosophy of Science and Technology[1]

[1] Significance of abbreviations in Figure 1:
AIHS – Académie Internationale d'Histoire des Science
UNO – United Nations Organization,
UNESCO – United Nations Educational, Scientific and Cultural Organization,
ICSU – International Council of Science Scientific Unions,
IUHPS – International Union of History and Philosophy of Science,
IUHPST – International Union of History and Philosophy of Science and Technology,
IUHPST/DLMPST – Division of Logic, Methodology and Philosophy of Science and Technology of IUHPST,
IUHPST/DHST – Division of History of Science and Technology of IUHPST,
ICOHTEC – International Committee for the History of Technology.

● February 22, 1957 – By the decision of the Presidium of the Romanian Academy, it is approved that the CRIFS structure includes the following members:

Acad. Grigore Moisil (1906–1973), mathematician, full member since 1948,

Acad. Stefan Ghika Budeşti (1904–1959), geologist, corresponding member since 1955,

Acad. Eugen Angelescu (1896–1968), chemist, full member since 1963,

Prof. Simion Iagnov (1892–1958), doctor, corresponding member since 1948,

Acad. Remus Raduleţ (1904–1984), engineer, full member since 1963,

Acad. Mihai Ralea (1896–1964), sociologist, psychologist, full member since 1948,

Acad. Emil Pop (1897–1974), botanist, full member since 1955,

Acad. Iorgu Iordan (1888–1986), linguist, philologist, full member since 1945.

● March 28, 1957 – The Bureau of the Presidium of the Romanian Academy approves the CRIFS structure formed by the eight personalities, the designation of Academician Mihai Ralea as CRIFS president and the philosopher Athanase Joja (1904–1972) as CRIFS vice-president, both constantly involved in the issue of history and philosophy of science.

● August 20, 1957 – The Secretary of the International Union for the History and Philosophy of Science (IUHS), René Taton (1915–2004), confirms the accession of the Romanian Academy to the UIHS, through the newly created Committee within the Romanian Academy. It is recommended to divide this committee into two sections, following the model of the IUHPS structure, with a division of History of Science and a division of Philosophy of Science. The professor of logic Athanase Joja decisive a hard word in the composition of the two commissions As a result, CRIFS was organized into two separate commissions: the Commission for the History of Science, chaired by the academician Stefan Bălan (1913–1991) and the Commission for the Philosophy of Science, chaired by the academician Grigore Moisil. After the death of Grigore Moisil in 1973, academician Octav Onicescu was elected as president of the Commission for the Philosophy of Science.

The Romanian Committee for the History and Philosophy of Science through its two commissions, affiliated to the International Union of History and Philosophy of Science (IUHPS), actively encouraged research in the field of history and philosophy of science. It is worth mentioning the names of prominent personalities who coordinated the activity of CRIFS during the period (1957–1991):

Presidents of CRIFS	Period
Acad. Mihai Ralea	March 28, 1957 – August 17, 1964
Acad. Athanase Joja	February 8, 1965 – November 7, 1972
Acad. Ştefan Milcu	November 30, 1972 – April 29, 1982
Acad. Ştefan Bălan	November 12, 1982 – March 1991

Year after year, CRIFS activity multiplied and diversified and CRIFS status was continuously improved. The changes mainly related to the composition and structure of CRIFS. Thus, the CRIFS component included not only academics but also other specialists in the history and philosophy of science and technology. Likewise, the

organizational structure has diversified, including several divisions and subsidiaries, distributed throughout the country.

The titular and associate members of CRIFS, in collaboration with other specialists, have prepared important works on the history of science and technology in Romania, as well as to develop specific bibliographies (Berindei 2016).

A new reorganization of CRIFS took place after the historic year 1989, which marked the end of over forty years of communist regime in Romania. The transition towards a free and democratic society included all aspects of economic, social and political life, the renewal processes at the level of academic institutions being also remarkable.

In the meeting of the Romanian Academy held on February 7, 1992, the president, Acad. Mihai Drăgănescu (1929–2010), proposed the reorganization of CRIFS, by establishing a new division, which would contribute and boost research in the field of the history of technique and technology. Thus, a new structure of CRIFS is approved, which becomes CRIFST – the Romanian Committee for the History and Philosophy of Science and Technology, with three divisions:

● History of Science Division (DIS), chaired by Acad. Gleb Drăgan,

● Division of Logic, Methodology and Philosophy of Science (DLMFS), chaired by Acad. Mircea Malița,

● Division of History of Technique (DIT), chaired by Acad. Horia Colan.

It is worth mentioning the names of the outstanding personalities who coordinated the activity of CRIFST during the period (1992–present).

Presidents of CRIFST	Period
Acad. Mihai Drăgănescu	February 7, 1992 – May 9, 1994
Acad. Ștefan Milcu	June 10, 1994 – December 1, 1997
Acad. Mihai Drăgănescu	January 1998 – 4 October 2010
Acad. Dan Berindei	October 5, 2010 –November 8, 2018
Acad. Bogdan Simionescu	November 9, 2018 – present

CRIFST has benefited from multiple collaborations with international bodies in the field. An analysis of these collaborations is presented below.

CRIFST AND INTERNATIONAL COLLABORATIONS

It should be mentioned that IUHPS, which became IUHPST in 2015, has only institutional members. Each country is represented in each of the two divisions (DHST and DLMPST) by a single institution. In the case of Romania, the Romanian Academy is represented by CRIFST.

Romania, through CRIFS, joined the IUHPS / DHS in 1957 and in 1962 it joined the DLMPS of the IUHPS.

The Romanian Academy, through CRIFST, supported the achievement of the IUHPST objectives regarding the development and dissemination of studies and research both in the fields of the history of science and technology as well as in those

of their logic, methodology and philosophy, while maintaining the unity between the different branches of human knowledge. Every four years, the two divisions of IUHPST alternately organize an international congress.

There are multiple actions of CRIFST that over time have amplified the collaboration with IUHPST.

Among the top collaborations between IUHPST and personalities from Romania, the contribution brought by the renowned Romanian mathematician and science historian Petre Sergescu (1893–1954) is remarkable. He was General Secretary of IUHPST/DHST in three legislatures (1947–1950; 1950–1953; 1953). In the third legislature, after the premature death of the scientist (1954), his place was taken over by René Taton (Herlea 2018/2019; Herlea 2020).

In fact, Petre Sergescu carried out a sustained activity since the 1930s, by actively participating in conferences related to the history and philosophy of science. Thus, in Romania, Sergescu edits the bilingual (Romanian and French) *Matematica* journal, together with D. Pompeiu and G. Țițeica. Until 1948, 23 issues appeared, demonstrating the high level of knowledge in the field of mathematics at that time. Petre Sergescu is the one who organized the first congresses of Romanian mathematicians (in Cluj in 1929, and in Turnu Severin in 1932) and took part in the congress in Bucharest in 1945. He was known and recognized for his interventions at meetings and congresses abroad from Poland, Czechoslovakia, and France (Stavinschi 2014; Duca 2018).

SOME ASPECTS OF CRIFST COOPERATION WITH IUHPST/DLMPST

The congresses organized by the DLMPST division of the IUHPST were meant to bring together representatives from different countries to promote aspects related to the logic, methodology and philosophy of science. Up to now, 18 IUHPST/DLMPST congresses have been organized, whose dynamics are presented in Figure 2 (http://dlmps.org/pages/past-congresses.php)
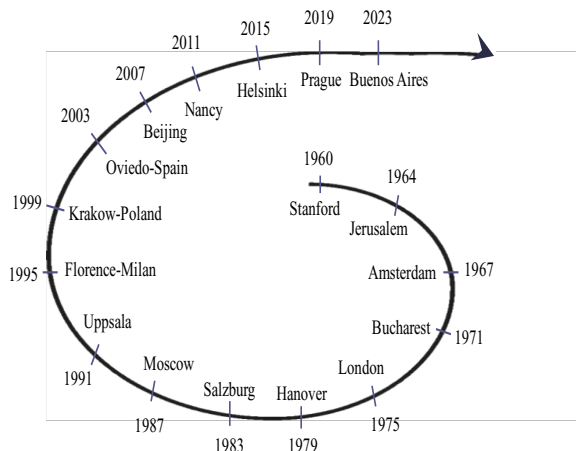

Figure 2. List of congresses organized by IUHPST/DLMPST

One of the important Romanian contributions within the IUHPS/DLMPS activities is the organization in Bucharest of the 4th International Congress IUHPS/DLMPS, in 1971 (29 August – 4 September).

The Romanian Organizing Committee included: Athanase Joja, Grigore Moisil and C. Popovici as General Secretary. The Chairmen of Section "Methodology and Philosophy of Linguistics" was Solomon Marcus, a renowned historiographer of the history of science (Otlacan 2017).

Prestigious logicians and philosophers of sciences from around the world participated in this congress, among them: G.H. von Wright, P. Supes, J. Hintikka, Bruno de Finetti, G. Paatzig, W. Stegmuller, and Reimond Klibarsky, the president of the International Institute of Philosophy.

About the organisation and communications sustained in this congress, numerous records were made in the DLMPS Bulletins (Synthese 1972; IUHPS/DLMPS Proceedings 1974; Joja Cr. 2000)[2].

SOME ASPECTS OF CRIFST COOPERATION WITH IUHPST/DHT

The congresses organized by the DHST division of IUHPST brought together representatives from different countries of the world to promote aspects related to the history of science and technology. Until now, 26 IUHPST/DHST congresses hav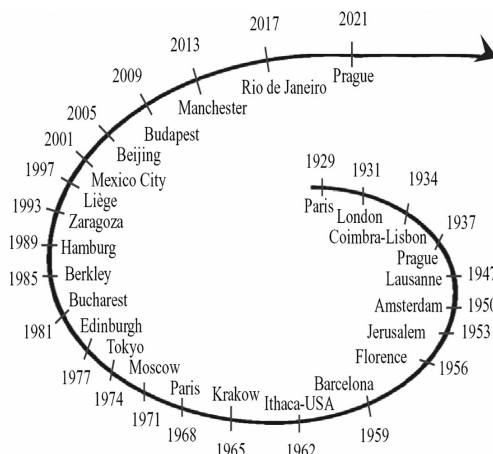e been organized, their dynamics are presented in Figure 3 (http://dhstweb.org/dhst-congresses) (http://dhstweb.org/dhst-congresses)

Figure 3. List of congresses organized by IUHPST/DHST

[2] The significance and international scientific importance of the congress was evidenced by the volume devoted to the works of this congress: Proceedings of the Fourth International Congress of Logic Methodology and Philosophy of Science, Bucharest, 1971. Edited by Patrick Suppes, Stanford University, USA, Leon Henkin, University of California, USA, Athanase Joja, Romanian Academy, Gr. C. Moisil, University of Bucharest, Romania, North Holland Publishing Company Amsterdam, London, 1973, 981 p.

The 16th Congress of International Union of History and Philosophy of Science/ Division of the History of Science (IUHPS/DHS) was organized in Bucharest (August 26–September 3, 1981), under the auspices of UNESCO, by IUHPS/DHS and by the Romanian Academy.

Important representatives of IUHPS/DHT from five continents were present. They stood out for their contribution: René Taton, Michael Duffy, Joseph Needham, Hans Braun, Alexandru Herlea, already established in France. A large number of specialists from Romania participated.

One of the main themes of the congress was related to the relationship between the history of science and the history of technology. In the Report presented to the participants, academician Ștefan Bălan made an x-ray about the contribution of the Romanian Academy and CRIFST, the body created by the Academy, to stimulate the development of research in the history of science and technology in Romania (Balan 1981).

The meetings on specialized topics included a wide range of issues: Interaction among the natural, technical, and social sciences; Necessity and chance in scientific discovery; Mathematics-Physics relationships beginning with the 18th century; Development of science and technology in the Far-East; Primary sources for the history of science and technology (IUHPS/DHT Proceeding 1981)[3].

The international participation in this Congress was remarkable. However, the debates were limited by the atmosphere created by the political factor. Still, the effects of the Cold War were felt.

A recognition of Romania's contribution to supporting the activities of IUHPST is the obtaining of the position of member in Executive Committee of IUHPST/DHST by Acad. Stefan Bălan in two legislatures (1971–1981) and (1982–1985). In 1978 Acad. Stefan Bălan was elected a member of Académie Internationale d'Histoire des Science from Paris (Alexandrescu 2014).

The collaboration with IUHPST continued even after 1989, the Romanian representatives on the IUHPST board being Acad. Mihai Drăgănescu and Acad. Horia Colan (http://dhstweb.org).

SOME ASPECTS ON CRIFST COLLABORATIONS AND COOPERATION WITH ICOHTEC

The International Committee for History of Technology (ICOHTEC) is one of the three financially autonomous sections of DHST, which is de facto an international scientific society for the history of technology that organizes an annual symposium, which every four years, takes place within the IUHPST congress of IUHPST/DHST. In the first decade, until the mid-1980s, symposia were organized every two years, one of them taking place within a congress of IUHPST/DHST. ICOHTEC publishes the journal ICON since 1994.

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[3] The four volumes of the Congress Proceedings (a total of 2032 pages) were published by the Romanian Academy with the titles: Scientific Sections (I A), Symposia (II B), Meetings on Specialized Topics (III C) and Commemorations (III D), Reports annexes (IV A, B, C, D).

The events of 1989, marked by the fall of the Berlin Wall and the major transformations in Eastern Europe, also had an impact on the reorientation of ICOHTEC. In 1993, at the 19th IUHPS/DHS Congress held in Zaragoza, ICOHTEC turned into a classic academic society, to which individual members, specialists in the history of science and technology, could also join. The objective of putting the specialists from beyond the "iron curtain" in contact was no longer topical. The goal of creating new collaboration bridges between specialists from all over the world regarding the study of the history of technology and new perspectives for reconstruction and development remained important (Weber 2009).

Until 2023, 49 ICOHTEC symposia have been organized; in 2023 the 50th ICOHTEC Symposium will be organized (www.icohtec.org).

Significant Romanian contributions can be noted in CRIFST's cooperation with ICOHTEC, by participating in organized ICOHTEC sessions and symposia, by speaking and presenting works on the history of science and technology, by the activity within the ICOHTEC Executive Committee. The following were noted:

● Acad. Stefan Bălan, president of CRIFST – member of the ICOHTEC Executive Board and then president of ICOHTEC, between 1981–1989,

● Acad. Horia Colan, president of the Division of History of Technique within CRIFST – representative of CRIFST at the ICHST/DHST Congresses and ICOHTEC Symposiums,

● Prof. Dr. Eng. Alexandru Herlea, DHC – member of the ICOHTEC Executive Board, vice-president and then president of ICOHTEC between 2001–2005, full member of Académie Internationale d'Histoire des Science,

● Prof. dr. Liviu Alexandru Sofonea, president of the Brasov Branch of CRIFST – distinguished himself through communications and debates in the field of history and philosophy of physical sciences but also astronomy, anthropology, environment, representative of Romania in the Executive Committee of ICOHTEC for over two decades,

● Dr. Alexandru Bologa – significant communications in the field of the history of marine biology,

● Prof. dr. Eufrosina Otlacan – passed the studies in the history of astronomy, mathematics and in the field of education,

● Prof. Dr. Eng. Elena Helerea – with communications and studies in the history of electrical engineering and in the current issue of industrialization and deindustrialization in Romania, member of the ICOHTEC Executive Board, between 2009–2013, and one of the organizer of the ICOTEC Symposium in Brasov, in 2014.

In cooperation with ICOHTEC, Prof. Dr. Eng. Alexandru Herlea had and still has an active role. Leaving the country in 1972, he works as a professor of the history of science and technology at renowned institutions in France. Alexandru Herlea was active for 16 years as a member of the ICOHTEC Executive Committee as treasurer (1993–1997), vice-president (1997–2001), then president (2001–2005) and former president (2005–2009). He contributed to the organization of four ICOHTEC symposia during his presidency and three other ICOHTEC symposia: in Paris (1990),

in Belfort (1999), in Brașov (2014) where he supported the organization of a special session addressed to Eastern European issues.

With support from ICOHTEC, Alexandru Herlea, together with Prof. Juan-José Saldania from Mexic, took steps to change the name of IUHPS to IUHPST. He also campaigned for the rapprochement between the two divisions of the IUHPS. Thus, at the IUHPS/DLMPS congress in Oviedo in 2003, a session entitled: "Philosophy, methodology and history of technology" was organized. Thus, the technology was present, a premiere at a DLMPS congress (Weber 2009).

One of the important contributions of CRIFST within ICOHTEC activities was the organization in Brasov of the 41st ICOHTEC Symposium in 2014, between 29 July–2 August, with topics „Technology in Times of Transition" (Bartha 2014; Helerea 2014; Herlea 2014)[4].

NOESIS JOURNAL – PUBLICATION OF CRIFST OF THE ROMANIAN ACADEMY

In 1973, the year of the appearance of the first issue of Noesis journal, the Romanian Committee for the History and Philosophy of Science and Technology carried out its activity under the name of the Romanian Committee for the History and Philosophy of Science (CRIFS). We will use this name in the analysis of the beginning period of the NOESIS journal.

Until 1989, the CRIFS activities of the Academy of the Socialist Republic of Romania were disseminated through the meetings and scientific publications of the Academy and through other public events. There were specific ways of organizing and conducting the CRIFST Communication Sessions.

Thus, after 1970, as a rule, CRIFST organized two annual sessions of scientific communications on the history of science and technology, which took place both in Bucharest and in other important localities of the country. Such sessions trained personalities from the permanent sections of the Academy but also specialists from other research and higher education institutions from different branches of science. The issues addressed were related to: the history of education, the history of Romanian pedagogy, the history of Romanian aviation, the history of Romanian science, the history of Romanian technology. There was also the theme of "patriotic education of the youth". A large audience participates in the sessions of communication of the results of various research activities, in which each communication was followed by discussions and debates.

Other sessions took place in the country, in Brașov, Cluj-Napoca and in other branches of the Academy. Thus, in the organization of a CRIFST session "held in the

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[4] The significance and international scientific importance of the congress was evidenced by the volume devoted to the works of this congress: *Proceedings of the Fourth International Congress of Logic Methodology and Philosophy of Science, Bucharest, 1971.* Edited by Patrick Suppes, Stanford University, USA, Leon Henkin, University of California, USA, Athanase Joja, Romanian Academy, Gr. C. Moisil, University of Bucharest, Romania, North Holland Publishing Company Amsterdam, London, 1973, 981 p.

old and extremely industrialized city of Brașov" is detailed, which had as its theme the evolution of technologies, the technical development of the city, the expansion of education. It is certain that among the organizers was professor Liviu Sofonea, who at that time was preparing a doctorate in the history of science, under the coordination of Acad. Stefan Bălan (Balan 1981).

The audience at the CRIFST communications sessions has continuously increased, as well as the number of presented communications. For example, the CRIFST communications session of 15–17 May 1975 included a number of over 80 communications in the fields: History of pedagogy (15), History of mathematics (5), Popular and scientific medicine (9), History of technical sciences (6), History of institutions (6), History of pharmacy (15), Policy of science (14), History of natural sciences (16) (IUHPS/DHS Proceedings 1981).

Part of the communications held at these scientific sessions were published in the form of fascicles, centered on different scientific branches, as publications of the CRIFS under the aegis of Romanian Academy.

The role of the Romanian Academy was determined in channeling the research activity towards the preparation of treatises and monographs, an activity started in 1970. However, the need for a serial publication was felt.

In the inaugural speech of the Philosophy and History of Science Colloquium, held in April–May 1972, Athanase Joja, president of CRIFST at that time, announced the decision to start publishing the scientific works in the volumes of the NOESIS collection (Joja Cr. 2000). This decision was driven by the positive impact on the international scientific community related to the organization in Bucharest of the 4th International Congress of Logic, Methodology and Philosophy of Sciences (August 29–September 4, 1971).

After the death of Acad. Athanase Joja in 1972, under the presidency of Acad. Ștefan Milcu, CRIFST continues the preparation of the first volume of Noesis journal, as an annual periodical publication.

The Noesis magazine, with the subtitle *Travaux du Comité Roumain d'Histoire et de Philosophie des Sciences* (the subtitle Works of the Romanian Committee for the History and Philosophy of Science) was going to have as the main objectives: publishing scientific research in the field of history and philosophy of science, making the results known scientific communications held at the sessions organized by CRIFS, but also the publication of scientific papers in the field. It was intended that the articles be written in an international language and that the volumes of the magazine be distributed in as many countries as possible.

The Noesis magazine structure should correspond to the IUHPS structure to which CRIFS was affiliated. The two major sections of the magazine were coneceived to correspond to the two divisions of the IUHPS: the Philosophy of Science Section and the History of Science Section.

The first volume of NOESIS journal appeared in 1973 under the coordination of the Acad. Athanase Joja, until his death, and Acad. Stefan Milcu. Starting with the second volume, the direction of the editorial board was entrusted to Acad. Stefan Milcu, endocrinologist and philosopher in biology, then to Acad. Stefan Bălan,

professor of mechanics and the history of mechanics. After 1990, the coordination of the editorial team returned to Acad. Mihai Drăgănescu.

The first volume of Noesis journal appeared in 1973, including 33 articles, from six colloquia, of which one is on Logic and the other five on History of Science. In this issue, the inaugural speech of the Acad. Athanase Joja is noted, in which the great logician formulated an answer to the question: why is it necessary to study the history of sciences?

"… Man is a being who not only has a present, but also a past, so also a future. Interest in the past and concern for the future are the prerogatives of man.

Hence, the attraction for history, in general, for the history of art, philosophy and sciences in particular. The interest in art history and philosophy is easy to understand, because Kant is not less profound than Plato or Aristotle, but only otherwise more profound; that Baudelaire is not more pathetic than Euripides and Dante, but in a different way. ... The art and philosophy of the 20th century are not more extensive than the art and philosophy of the 16th–17th centuries. But modern science, in an undoubted way, is more advanced than Euclid's geometry, Aristotle's biology or Archimedes' mechanics.

Then, since we are dealing with the history of science, what is the use of this retrospective study? Why a large number of valuable scholars such as Moritz Cantor, Gino Loria, Duhem, Tannery, George Sarton, Cassirer, Koyrée dedicated themselves with passion to this discipline, which is taught nowadays in the great universities... It is of course unique because it answers the thirst for knowledge of the past..." (Joja Ath. 1973).

The problems addressed in the following issues of the magazine have been related to the evolution of the two disciplines, without neglecting their philosophical, scientific and historical interdependencies.

In the XXV anniversary volume of NOESIS, Crisantema Joja made a detailed retrospective on the subjects covered in the NOESIS issues published between 1973 and 2000 (Joja Cr. 2000), and under the editorship of eng. Ioan Vasile Buiu, the NOESIS (1973–2000) indexes of papers and authors are published (Buiu 2020).

CONCLUSIONS

At the beginning of the communist regime in Romania, there were great difficulties in affirming the disciplines of history and philosophy of science, generated by multiple internal and external causes: Sovietization, satelliteization, the Iron Curtain, and the Cold War. It was a complex process of destruction-reconstruction, change-continuity, at the level of higher education institutions, and especially at the level of the highest forum, which is the Romanian Academy.

Only after 1955, internal and external conditions became favorable for extension of cooperation between the Romanian Academy and international bodies in the field of history and philosophy of science. Thus, in the years 1956/1957, the CRIFS of the Romanian Academy was established, as an instrument for promoting the disciplines

of history and philosophy of science and for cooperation with international bodies in the field.

Over time, CRIFST has developed multiple methods of action, the most notable of which is the launch in 1973 of its publication, NOESIS, which today reached its 50th anniversary.

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PHILOSOPHY OF SCIENCE

REFLECTIONS ON CAUSES AND IMPLICATIONS
OF INFORMATION OVERLOAD

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Abstract: The topic of information overload is analysed pragmatically and phenomenologically, providing insight into the causes of the phenomenon, possible remedies, and broader implications. The discussion on the broader context touches on more abstract issues that include a discussion on infosphere, the ramifications of the replacement of offline (physical) experience with the reading experience, and the discussion on the relevance of modes of information delivery viewed through the prism of different forms of orality employed on the Internet. Special attention is given to the analysis of information fatigue syndrome. The requirement to educate users in the areas of reading literacy and information literacy is emphasized.

Keywords: information overload, information fatigue syndrome, infosphere, information literacy, reading literacy

1. FROM INFORMATION SCARCITY TO INFORMATION OVERLOAD

Before the modern era, information was far from free or even available: it was controlled by powerful and wealthy individuals and shared only among members of closed social circles. It was not until the mid-20th century that information became more widely accessible, mainly thanks to the technological development of the post-World War II era. The most radical change, however, started taking place in the late 20th century, when the so-called digital turn brought about the rapid development of the internet infrastructure and other wireless technologies, enabling information to be stored in digital format and easily shared (Cowhey et al. 2009, 1). This led to processes of deep social change and triggered the formation of the so-called information society (Bartosz 2022, 1) where, for the largest part, economic, political, and cultural actions rely on how information is produced, distributed, exchanged, and manipulated.

Numerous social, political, cultural, and economic issues have indeed become much more easily manageable thanks to the accessibility of information and the digitally-based exchange of knowledge and data. However, as available information began to multiply and circulate, new problems, such as the formation of competitively charged information rush and/or commodification of information itself, began to arise. The desire to discover relevant information and apply it to achieve personal or business success tends to create an imbalance in the way information is perceived and handled, which gave rise to the tendency to replace its public function with the purposes related to fulfilling personal needs of the users (Simpson and Prusak 1995, 414). Amongst the downsides of the process of democratization of information are also the problems of data security and the vulnerability of users increasingly exposed to phenomena such as

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data breaches, hacking, malware, and identity theft, as well as the lack of understanding of information itself. Such deviations can be said to be manifestations of a broader phenomenon which is usually referred to as information overload, sometimes also more vividly termed infobesity, infoxication, and/or information explosion.

Information overload is a characteristic of the present era (Rosenberg 2003, 1). It takes place when a user perceives that there is too much potentially valuable information available, and the realization turns this load into a burden instead of an asset (Bawden and Robinson 2020, 3). Originally seen as a problem concerning only scholars, it has in the meantime been recognized as a major concern to people of all professions, such as medicine, education, politics, or business, but also tends to migrate into the less formal side of life. The perceived merger of actual life and cyber life may lead to the blurring of boundaries between online and offline realities, and between the online and offline communities (Bawden and Robinson 2020, 1), which gives rise to the notion of life as "infosphere" (or "inforeality") within which human protagonists tend to be reductively perceived as informational organisms ("inforgs"). The "inforgs" are out there, day and night, chasing information; the obsession to find it and apply it faster and sooner, as to achieve measurable results, sets them against each other. They tend to lose sight of the humanity of other users, and they tend to commodify rather than critically assess the very information that they are attempting to understand and apply (Simpson and Prusak 1995, 414). This raises ethical questions as well as practical ones while going hand in hand with the inevitable "information fatigue syndrome" (Groes 2016, 2), characterized by symptoms such as distraction, inability to focus or make decisions, fatigue, anxiety, and loss of identity, but also loss of control, stress, confusion, reduced decision-making capacity, demotivation, lack of perspective, communication breakdown, inability to select relevant information, increased possibility of errors, failure to learn from new information, lack of control, etc. (Eppler and Mengis 2004, 1119). Further terms used to point to the negative effects of digital saturation are "avalanche of information", "information burden", "information anxiety", "filter failure", "digital stress", etc. (Lehman and Miller 2020). All these elements contribute to the questioning of the popular belief on openness, transparency, availability, usefulness, etc. of the digital environment while depicting the present-day society as "information-rich, but knowledge-poor" (Groes 2016, 2). While there is certainly no lack of useless information, valuable information may seem too far from reach as in the past (though, for different reasons), or perhaps obtainable but harder than ever to interpret and apply.

2. IMPLICATIONS, CAUSES, AND POTENTIAL REMEDIES

Technological development, and especially the refinement of search engines, has resulted in the overabundance of information that can reach users from numerous sources, which often makes it impossible for users to retrieve all the available data (Hoq 2016, 53). More than likely omissions can cause stress to individuals who find themselves under time pressure to locate, obtain and make use of the information

they need. Too often, the important information is outnumbered by insignificant data, which only adds to the confusion. This not only potentially destroys productivity in the working environment but can also be expressed in terms of overload-related material annual losses of companies around the world, measured to the value of $650 billion in 2007 (Lohr 2007, cited in Roetzel 2017).

Information on the internet is clickable and may be – at least for the largest part – easily accrued upon shallow browsing. Paradoxically, it is the very ease of accrual that appears to undermine the quality of reading and the process of understanding. It accounts for the speedy cumulation of data, as well as for the diversity of information, while progressively diminishing the users' ability to identify key points and focus on them. Both the speed and the variety appear to harm understanding, as quantity is given precedence over quality, and treated as a value *per se*. This points to reasons why the distraction from knowledge, rather than knowledge, has come to be referred to as "a contemporary cultural cognitive condition" (Hassan 2012: 11), and why Robert Hassan chose to underline the aphasic-like dimension "of our hyper-distracted networked lives" (Hassan 2012, 61) by calling his book *The Age of Distraction*. Since reading has come to be approached as a matter of accumulating data rather than one of understanding why the data is needed and how it can be productively applied, attention has been drawn to the alarming fact that we, as a culture, appear to be facing a serious (reading) literacy crisis (Soler and Openshaw 2006).

Further implications are no less than alarming. The Internet changed human behaviour and affected not only thought processing but also human emotions and the capabilities for empathy and kindness (Groes 2016, 3). Face-to-face interaction between individuals has been largely replaced by communication across social media, chats, messengers, electronic mail, and voice messaging; technology has inserted itself into every aspect of human existence (Onyeator and Ngozi 2019, 35). Furthermore, the new platforms have immersive properties which can affect users' sense of identity, both individually and socially (Groes 2016, 3). While people as "information organisms" may feel connected to the entire world (Levin and Mamlok 2021), they are also likely to feel anxiety about being deprived of real human contact, which prompts them to increase the speed of information accrual to combat their sense of anxiety with frenzy, potentially leading to even more anxiety. As the two formerly separate realities, online and offline, appear to merge into one (Granic et al. 2020, 196), the landscape of the perceived new infosphere becomes more dynamic and increasingly less stable. The human experience gets to be transformed into a 'reading experience', which makes living within the infosphere correlative to the notion of reading an endless and ever-changing "book", unstable in content and in form.

Since information seekers are primarily engaged as readers, they need to be taught to assume control over the process, rather than to find themselves submerged within it. Recognition and understanding are fundamental components of any reading process. The process of reading encompasses activities that use several cognitive functions associated with different parts of the brain needed to create a functional mental map that provides a meaningful context to any new content. This map is, however, never a permanent one; it is subject to continuous redesign,

due to the dynamic nature of reading and understanding (Klingberg 2009, 11). The reading process furthermore involves the processing of verbal but also largely visual information (schemes, diagrams, graphs, maps, infographics, etc.). When an image joins the verbal text, the process of reading and understanding is likely to be accelerated and improved, which is known as the "multimedia effect" (Schnotz 2002, 115). As an iconic sign, the image facilitates the process of mental modeling of meaning and enables the reader to establish a direct connection between the stimuli and mental images, which aids in the learning process. Images increase the degree of explicitness of the message and reduce the level of possible ambiguity (Schnotz and Bannert, 2003 142), which can greatly facilitate the understanding of certain meanings. Images also help in directing attention to more important parts of the text and are applicable in establishing mental models necessary for the acceptance of new meanings (Pike *et al.* 2010, 243). Illustrated text is a double-coded text, and the so-called "dual coding" strengthens the representational side of the communication code, hence facilitating the process of accessing the deeper levels of meaning (Paivio 2006,3).

However, when a user is overwhelmed by the input of information, some of these functions slow down and may even fail, negatively affecting the reading outcomes and reducing the ability to contextualize the information received (Murayama et al. 2016, 914). When the amount of information exceeds the processing capacities of the human brain, this also negatively impacts the user's ability to set priorities and remember previously processed information (Hoq 2016, 53). The processing of all the information comes at a cost, and this may be the loss of the ability to distinguish between important and unimportant information (Levitin, 2014). Every new e-mail we read and every text message we receive drains the users' cognitive resources hence reducing the ability of the brain to perform certain tasks (Iskander 2019, 326).

If the process of (shallow) reading can indeed be perceived as a substitute for the reality of direct physical experience and become as uncontrollable as life itself, we may do well to ask ourselves if "what we do on the computer should even be classified as reading or if it is something else" (Ulin 2010, 105). We might furthermore follow Ulin's suggestion and examine the issue of reading in the age of technology "through the filter of 'secondary orality'. The concept of secondary orality was framed by Walter Ong in his 1982 book *Orality and Literacy: The Technologizing of the Word*" (Ulin 2010, 105). According to Ong, primary orality is "the orality of cultures untouched by literacy" (Ong 198, 5), and secondary orality is "consequent upon and dependent upon writing and print" (Ong 1982, 167), i.e., the practice of speech shaped by the traditions of reading and writing. Our physical interaction appears to be 'impure' and 'culturally stained' by the communication practices that take place outside the physical reality of a living human being. Likewise, the process of reading across the Internet assumes some traits of listening/hearing originating from our experience of the exchange of oral messages. As Ulin puts it, "Ong's idea is that, in an era of nearly instantaneous, and collaborative, mass communication, the linearity of print or written language elides into a more fluid stew of information that mirrors the back-and-forth of oral cultures even as it relies on the most highly developed technologies." (Ulin 2010, 105).

Hence, the users read, write, listen, and talk, but simultaneously, they simulate reading, writing, listening, and talking. It is therefore not only the excess of information that weighs on the communication process, but also a multitude of intertwined and practically inseparable modes. These include writing and speaking, as well as hybrid forms such as written speech and spoken writing, all of which are subject to self-multiplying, echoing, and intermingling across the Internet while being used to deliver and constantly redeliver both new and old information. According to statistics (Flynn, 2023), an average user of the Internet in America checks their cell phone around 96 times a day (on average: every 10 minutes), which is a strong indication of the level at which the human brain is engaged in gathering useless information while pursuing useful one, at the same time dealing with the requirement to keep switching focus at an extremely high pace and to deal with different forms of orality employed in the delivery of data. Hence, not just the quantity of data, but also the frequency of stepping in and out of the online zone, topped with the diversity of modes of delivery of information causes cognitive overstimulation that all too easily leads to mental exhaustion (Marois and Ivanoff 2005, 298). Researchers have established that the relationship between the users' performance and acquired information has an inverted U-curve (Eppler and Mengis 2004, 1119). This means that a person can only acquire information up to a certain point. When additional information is introduced past that point, the performance of the user is bound to decline.

The difficulties in the human processing of the ever-increasing loads of information can partly be attributed to human cognitive limitations, and partly related to the very design of information management systems. Such systems are pre-programmed and highly uniformed, thus pressuring users into a high degree of adaptation while leaving little room for the application of individual thought patterns and other personal characteristics. In line with this, the same flaw appears to apply to the overall research into the topic of information overload, which tends to focus on "hard" technical characteristics of information management systems such as "algorithm efficiency, availability, compatibility, system feature design, and visualization" and insufficiently on "soft" characteristics that might help "shift the focus from a more technical viewpoint to a psychological viewpoint" (Roetzel 2019, 507).

In their review of literature on information overload, Bawden and Robinson (2020, 14) attempted, however, to cover broader grounds by pointing to four main causes of information overload: (1) too much information, (2) variety, density, and novelty of information, (3) imposed information, and (4) individual aspects and differences. The first cause, related to actual quantity, is often perceived as the main cause of information overload, seeing that it reflects the most "tangible" aspect of the syndrome. The fact that more information was created in the past 50 years than in the last 5000 years, best illustrates the context (Bawden and Robinson 2009, 184). Since it is impossible to process or read all the relevant material, even if trying to focus on a specific single topic, users are likely to become overwhelmed with the volume of available information, and unable to decide where to begin or finish analysing it. The second cause – variety, density, and constant inflow of new information – points to individual differences among users, as it affects the clarity of data perception, which

is why they are sometimes metaphorically referred to as "data smog" (Shenk 1997, cited in Bawden and Robinson 2020, 16). Adding to the problem is the fact that the same information may likely be retrievable from different sources yet via different formats across different media. This can make it hard to distinguish and locate useful, accurate, or reliable information (Schmitt et al. 2017, 1152), while pointing to yet another cause of the overload: 'imposed information', i.e. pressure, largely caused by the increased use of smartphones and other mobile devices (Walsh 2012, 57). Intertwined devices contribute to the creation of an intertwined environment where users are continuously subjected to new loads of information, parts of which are often reduplicated, reaching them largely via electronic mail or social media feeds. The fourth and final in Bawden and Robinson's list of causes are individual aspects and differences, which are largely shaped by personal characteristics such as education, level of knowledge, cultural background, style, etc. While these characteristics are bound to vary from user to user, the users' ability to deal with the constancy and volume of information inflow is likely to depend on their general digital literacy, or more specifically, on their information and reading literacy.

        That is why, it needs to be stressed that not everyone becomes overloaded nor do all users necessarily react in the same way (Savolainen 2007, 614) to the multi-directional information input which they are subjected to at their workplaces, but largely also in the course of their private time, largely thanks to their exposure to the media. Over the years, some scholars investigated whether certain personality traits make certain users more prone to being overloaded by information (Bawden and Robinson 2020, 19). It was shown that self-conscientiousness can mediate the relationship between information stress and well-being (Kominiarczuk and Ledzińska 2014), and that age can be a predictor of information overload when observing online news exposure (Schmitt, et al. 2018). In other words, the younger the individual, the more likely it is that they will submit to the information overload syndrome under exposure to online news. The same study has shown that respondents who have information-seeking confidence are less likely to feel overloaded (Schmitt et al. 2018). Recognizing information overload as a new "search obstacle" can also help in finding new ways of managing information and coping with the syndrome (Roetzel 2019, 509).

        Different causes of information overload have been noted to call for different remedies for coping with the syndrome. An overload can be controlled if efforts are made to make sure the information is valuable, delivered in a useful way and format, visualized, and compressed (Eppler & Mengis 2004, 1112). As information overload concerns not only individuals but severely affects organizations as well, many coping strategies have been proposed to reduce the effect of "information fatigue syndrome". In their study on senior managers in an industrial company, Janssen and Poot (2006) listed 75 approaches used by managers to overcome information overload, and came up with six aspects that can be applied to form a coping strategy: (1) attitudes (a person's ability to cope with stress), (2) selectiveness (an individual's ability to select and perceive relevant information), (3) decisiveness (the style of approaching new information), (4) information organization (the actions connected to storing/

discarding information), (5) raising awareness (promoting good communication practices), and 6) exploiting technology (using technological solutions to minimize information inflow, such as automatic message filtering). In another study on information overload, Savolainen (2007, 614) simplified the coping mechanisms by reducing them to two strategies: the filtering strategy and the withdrawal strategy. The filtering approach emphasizes information content, thus focusing only on useful information, while the withdrawal strategy restricts the sources of information to limit the negative influence.

The choice of strategy largely depends on the needs and preferences of the individual, which is an aspect that needs to be designed as part of the education for reading and information literacy. The ability to establish the level of relevance of information, regardless of the form in which it may be given, directly depends on such competencies of information users (Hoq, 2016). An information literate individual can (1) regulate the scope of needed information, (2) critically estimate the value of information and the credibility of sources, (3) include selected information in his/her knowledge base, (4) effectively use the information to achieve their objectives, (5) understand the economic, legal and social issues arising from the use of information, and (6) use the information under ethical principles. Furthermore, information literacy presupposes the ability to understand and adapt to a changing information environment or context (Koltay 2017, 770), and needs to be based on systematic and targeted education focused on the development of technological skills and understanding of the totality of the process of finding, using, and recycling information and knowledge (Hoq 2016).

3. SOME UNDERLYING REQUIREMENTS

While information overload, along with the resulting fatigue syndrome, can be viewed as a modern, largely email-messaging-apps-related malady that tends to produce negative effects on critical reasoning and poses a threat to the ecology of traditional offline values that we justifiably wish to preserve. In dealing with this "malady", however, it also seems worthwhile to remind ourselves of the fatigue once attributed to the abundance of information that became available in the 15th century, after the invention of the printing press, or of the fact that even the ancient Romans in the 1st century BC considered the abundance of books not only a challenge but also a distraction. Bearing such historical analogies in mind, Anne Blaire pointed to the fact that it was thanks to Gutenberg's innovations and the printing revolution that the "new methods of selecting, summarizing, sorting and storing" (Blair 2012) came to be devised, enabling the unconquerable flood of sources of information to be tamed as to open pathways that led to the enlightenment of the oncoming era. The overwhelming abundance of all kinds of digital data that we are facing today may therefore be more productively viewed as an incentive to discover innovative solutions that can lead us to new levels of knowledge, rather than in reductively negative terms (focusing just on cost, threat, fatigue), or even in reductively positive ones (as in equating data with knowledge itself).

Indeed, it was the methods of categorizing, contextualizing, selecting, reordering, and storing that enabled the researchers of the post-Gutenberg era to find their way through the newly available sources of information, and to put the discovered information into action, thus opening the doors to the knowledge revolution of the 17th century. This certainly sheds light on the fact that information itself is not yet knowledge, but rather a knowledge prerequisite. If knowledge were merely a body of quantifiable data rather than "information given meaning and integrated with other contents of understanding" (Bates 2005), there would probably be little reason to worry about information overload. However, with loads of data piling up at an incredible speed, in multiple formats and endless variants, not only does the knowledge value of 'the-more-the-better' approach come into question, but there also appears to be plenty of reason to refocus on the very notion of information. Does data, any and/or all, constitute – information? Furthermore, is it even possible to deal with information overload without invoking criteria to enable us to differentiate one from the other?

According to Bates, information is defined as "the pattern of organization of matter and energy". Furthermore, all information is "natural information, in that it exists in the material world of matter and energy", and it may be represented as encoded or embodied. Encoded information "has symbolic, linguistic, or signal-based patterns of organization", as opposed to embodied information, which is "the corporeal expression or manifestation of information previously in encoded form" (Bates 2006, 1044). Hence, information presupposes the existence of a pattern, but also some kind of representation, which means that it can be classified, and, at a higher level, cross-referenced by the logic of the pattern that it incorporates as well as by the format used to represent it. Patterns, of course, encode meanings, and meanings are sustained by formats, which points to the fact that the information value of data relies not only on the intrinsic patterning but also on our ability to recognize patterns and formats, to attribute meaning, to contextualize, piece together/ merge units of data and raising it to the level of information and subsequently to apply information, transforming it into knowledge.

Information literacy begins at the level of differentiating data from information. This is not to say that there may not be potential information value in the data that one may be unable to identify and categorize by pattern and format at some instance in time, but it does imply the need for the ability to separate information from raw data and from data bearing only potential information value. Though there is much more to the phenomenon of overload than this, information users are largely overloaded due to the inability to distinguish information from non-information and non-information from potential information. This is, above all, a deficiency in fundamental information literacy. In fact, a relatively recent study on such skills covering different populations within the academia describes, for example, the population of students as "knowledgeable in the technical aspects of Internet surfing" yet often "unable to distinguish technical abilities from information literacy skills"; as possessing „technological knowledge to manage different devices" while lacking

„critical thinking skills"   needed „to search, retrieve, and evaluate information" (Yevelson-Shorsher and Bronstein 2018). The fact that present-day students often find it easier to master and apply technical protocols than to distinguish between the qualitative and quantitative dimensions of knowledge provides a reason for concern.

While there is no unified answer to the problem of information overload, nor is there to be a single remedy applicable to the needs of all the users in all situations, a fruitful approach will not underestimate the complexity of the issue and the need for varied solutions targeting a whole range of manifestations of the phenomenon. However, on a more general level, it is just as important not to bypass the underlying requirements, i.e., the very fundamentals in the education of users in information literacy. In the information age, it is necessary for users to acquire a deep understanding of the nature of data, information, and knowledge, and it is somewhat paradoxical that, too often, this is not the case.

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FROM AUTOMATION TO CIBERNATION AND FROM DATAMATION TO SOCIOMATION: SOCIOMATIC SYSTEMS

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Abstract: The multisided but integrative, multilevel and unitary approach attempted here aims to a) model the place and role of technical factors that penetrate and influence all levels of social organization and to b) explain and guide the most complex and difficult to manage system, the social one, as well as the social evolution. This paper also aspires to find and show not only the complex technical processes, means and products involved, but also the more complex process of self-determination, that requires human and artificial collaborative agents as well as artificial social agents in processes called automation and cybernation, which precede datamation and sociomation. Some internal mechanisms of these processes, such as intellectual invention and social invention are studied. Future directions of study as well as foreseeable social trends are also considered in this research paper.

Keywords: intellectual invention and social invention; automation, cybernation, datamation and sociomation; human and artificial collaborative agents, artificial social agents, sociomatic systems.

INTRODUCTION

Social and even technical system's evolution has been until now either completely spontaneous or only politically directed, meaning it was determined with the help of a co-system of the global social system and not consciously or from within determined. Nowadays some social subsystems and systems have the possibility to behave as cybernetic systems, namely as self-determined systems.

Sociomatic conduct can be described as an automatic, efficient and project guided conduct. Advanced technical systems can function as models for the development of social systems. These technical systems have some characteristics of natural intelligent systems and some new features, like those highlighted at an International Conference for Computing and Philosophy (Pană 2006a, 366–378). They can be modeled and used to design and develop some emerging sub-systems or some privileged tendencies of the social system. The European Project includes, for example, the conceptual model of a knowledge society.

Technical culture is the one which imposes the greatest set of *new intellectual techniques* in all fields of activity. Thus, intellectual activity as a whole has been changed by using the *information machine* (the so-called computer), by launching intelligent agents and even multiagent systems, by proposing hypertext and communication techniques proved as effective both in elementary and high-level intellectual activities (Negulescu and Bărbat, 2004).

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The collaborative generation of knowledge by virtual groups and by new intellectual techniques is also studied. A deep integration of knowledge processing techniques by multi-agent systems with the communication facilities offered by the global hypertext of the web is also attempted (Pană 2002, 116–128).

Interactive and distributed learning processes assisted by knowledge based, intelligent and flexible systems are managed by specific techniques, with the aim to develop human abilities and competencies (Pană 2006b, 422–427).

At the same time, some human creations such as artificial intelligent systems (Drăgănescu 2001, 77–81) now become able to adapt their own behavior according to human and social requirements (Bărbat and Cretulescu 2003, 47–51), to the super-nature created by technology, the new technical artificial environment that now includes not only the "internet of things", but also the "internet of everything".

Both human and artificial intelligent systems are yet adapting themselves to the aims, conditions, means and results of human activity, to its artificial outcomes. Society itself consists in all of what we are adding to nature. Therefore, society is the first and the most important human invention, as well as the first man-made, artificial system.

But contemporary human creations are the most powerful because humans are inventing nowadays at the only specific human creation level, the intellectual one, and in the present dominant field of activity, that of the technological culture (Pană 2000, 147–170). Some technical achievements – agents of any sorts, from program sequences with cognitive or practical purposes to communication, health care and educational agents – are more and more human-like in their sets of tasks, functions and effectiveness (Trăuşan-Matu, Maraschi and Cerri 2002, 259–269).

These intelligent, pro-active and self-fulfilling agents like web-bots and know-bots have their own environment, a technical artificial and sometimes intellectual environment (Pană 2004, 83–92). They often interact with it or even transform and improve it and share this environment with the man who adapts his own activities, aptitudes and even cultural attitudes to this new environment (Pană 2003, 1198). In this way, both human and artificial intelligent agents are evolving. Their evolution is not a separate or parallel evolution but it is a co-evolution.

This common evolution is a cultural evolution and then a multileveled and multidimensional evolution. We are now at the beginning of this multisided evolution and in all the above-mentioned fields many important and urgent or only possible and foreseeable troubles are arising. The common ground for the effective solving of various types of emerging problems may be an integrative, sociotechnical and cybernetic approach, a sociomatic approach.

1. FROM AUTOMATION TO CYBERNATION

The main successive stages of the history of social systems are outcomes of automatic, intellectual and technical, natural and artificial processes. However, it must be emphasized that the formation and evolution of human intellectual capacities − a

process that can be called intellectualization − is the core component, including for the first step in this history, automation. However, it will be shown further that even this process is largely automated; for this reason, it is called in this text *intellimation,* while its study and enhancement was called *Intellectics* (Pană, 2006b). More, on the basis of a series of long-term researches, it can be asserted that intellimation has this well-deserved status also in relation to all other phases of social evolution, respectively of the sociomation process.

1.1. Natural and artificial in social systems

Directly and simply speaking, if the social system as a whole is a human creation – the first human-made artifact –, all social entities and events can be interpreted as artificial ones. On the other hand, natural events are habitually equated with spontaneous processes. However, spontaneous events can be either necessary or aleatory, but also automatic, such as breathing and heartbeats, or the supply – demand, and value – price relationships. People also agree that an artificial event has a controlled, coordinated and directed evolution.

It can be noted, at the same time, that social artificial events and products are often presented as being spontaneous, natural and benefic. Thus, a) coordinated activities or events are disguised as spontaneous, b) artificial products are frequently presented as natural and benefic, c) directed processes are accredited as conditions of occurrence for desirable outcomes.

Can some or even all social structures and processes be considered entities and phenomena not only artificial, but also automatic and, therefore, sociomatic? To answer this question it would be useful to clarify the relationships between α – artificial and technical; β – technical and automatic, and to discuss concepts/projects such as γ – human and artificial social automata; δ – human and artificial cognitive and practical entities, activities and processes.

Progresses in complex artificial entities conceiving, developing and implementing need interdisciplinary teams involved in both theoretical and practical activities, which are highlighted in some Romanian writings (Pană 2005, 32–34).

Some recent projects, which concern both human and artificial entities and aspects, may seem not only novel, but also extremely difficult to realize and implement, not only in intelligent machines, but even in humans, especially since they involve transformations that concern the highest level of human behavior, and not even all people are capable of such behavior.

However, since the intelligent machine is charged with more and more responsibilities and collaborates more and more closely with humans (individuals and groups), such programs/behaviors are even more imperatively necessary

Such a project, developed at a conceptual level, seems difficult to be realized, first of all, because the founding theories themselves are contradictory today and, secondly, because the existing technical principles, norms and rules are still insufficient and inadequate (Pană 2018, 90).

The project of building an artificial ethics, suitable both for human and artificial moral agents, opens new research perspectives and allows the discovery of several broader future research and activity directions (Pană 2018, 94). These new research directions are updated here, with the aim to become suitable to develop various types of artificial intelligent agents, including of moral type. The following set of research and activity directions is proposed:

I. Setting-up a unitary and interdisciplinary strategy in artificial agents designing, a strategy which could be philosophically grounded, scientifically supported and technically realized.

II. Modeling a specific conduct as a net of cybernetic connections, governed by the complete set of cybernetic interaction types – feedback, feed-before and feed-up –, able to ensure inclusively the development (ascendant evolution) of a population of human and artificial agents.

III. Describing and decomposing each cybernetic step of action (cognition, intention, motivation, decision, execution, evaluation, anticipation) in practical units: activities, acts and actema.

IV. Using and inventing new information and knowledge-based soft techniques and technologies, appropriate for intelligent automatic social systems instantiating and mastering.

V. Building, modeling and implementing new sets of scientific, technical, economic, moral and political values with the aim to restore the social life on cultural bases.

1.2. Intellectual invention – the core of any type of invention, technical or social

Long ago, humans were already aware of their specific gift to add artificial objects of social (material or ideal) kind to those natural, i. e. to create culture, as an extension of nature. The oldest cyberneticist, Plato, in his *Republic* (Part II, Book II, 367 e – 383 c), offered the first description of society as a human design and an artificial product. Aristotle, in his turn, wrote in *Politics* (Book I, Chapter II, p. 7) about the automatic tools and installations of Daedal and even about the mentally controlled tripods created by Hephaestus, which served the multitude of gods or, at least, made useless the work of "living tools", the slaves.

An analytical examination of the first period of human intellectual concerns and capacities has been undertaken by a famous exegete of Homer's work, consisting predominantly of myths (Buffière, 2010). In his vision, even in the oldest period, three stages of evolution, respectively interpretative perspectives can be distinguished: physical, moral and theological. Within the physical perspective, the old, speculative period is overcome by a specialization trend, then materialized in a truly scientific approach, the one that could be built with the practical skills and intellectual tools of the period.

But Plato himself, trying to convince his disciples or even explaining something to his students, appealed to old myths or even constructed new ones. In his above-mentioned dialogue – one that occupies today a volume of about 500 pages –, a dialogue which is famous because it constitutes the space of building the ideal city,

the participants realize, from the beginning, that they are building the city only by mind and with the help of words. Wanting to make it more real, they then describe it down to the last detail, such as the requirement that the food be simple and healthy, but cooked (Plato, 368 d – 389 c).

Intellectual invention is the core of invention in each cultural field: technical, scientific, ethical or social and political (Pană, 2006 b), but intellectual invention does not necessarily precede any other kind of invention; some technical or social creations could necessitate an intellectual foundation or some invention can be simultaneously theoretical and practical, and more, they can even be made by the same person. But every significant human creation needs a lot of cultural conditions in addition to personal, innate and cultivated qualities, and is rooted in more than one single domain of the culture.

Invention is, in each cultural field, a complex activity, which can include (theoretical and/or experimental) studies but equally reflections, as well as constructive activities like intellectual operations, imaginative processes, instrumental manipulations and manufacturing processes.

With the advent and use of the intelligent machine, intellectual skills began to be more and more valued and cultivated, instead of those needed in practical activities, some authors observe. They also highlight the relevant social and psychological meanings of enhanced intellectual capacities (Zuboff 1988, 70–79; 197–207).

As a social phenomenon, invention is a system too, and includes many types of actions, relations, processes and even institutions. Social invention means the invention of new social structures, relations, activities and ideas, from the invention of institutions to the invention of values.

In the present, socio-technical system, characterized by a dynamic artificial intellectual environment, described by Pană (2006c and 2017), intellectual invention is a condition of a constant and even accelerated rate of social evolution.

Social invention includes scientific, technical, artistic and moral invention. Any invention, even that technical, is founded by an intellectual invention. The major social invention is the invention of social models.

This work also aims to highlight the strong inter-conditioning relationship of technical and social models, as well as the possibility and desirability of using natural and technical (artificial) models to found and apply social models.

Invention of the future as a form of intellectual and social invention concerns, theoretically, all the areas of the cultural invention, but has nowadays its new specific forms. A model of the future directs each individual or social project; science offers the methods, while technology the means of simulating and then fulfilling these models (see Pană 2005, 32–34).

2. CYBERN(ETIZ)ATION

The most important and spectacular are those inventions which are results of both intellectual and practical creations and bring significant and benefic changes in natural (physical and biotic) systems or even in social systems. The technical

activities, means and methods used at all structural levels of the social system, generate a retroactive influence that becomes the main motive force of social evolution.

A set of very complex retroactive, circular interactions appears in this way, by a process in which the managerial structures and activities, theories and practices are parts of all the above indicated levels of the social system and represent maybe the principal sociomatic factors.

Such active structures are the successive intellectual inventions anticipated, made and used by more or less known exponents of the ancient, medieval, Renaissance or modern engineers, philosophers and scientists, many of them affirmed even by the required interdisciplinary approach in the foundation and promotion of some essential inventions. These past inventors were often exponents of a lot of scientific and technical disciplines, and have made both intellectual and practical inventions by trespassing boundaries.

Even in the so-called Dark Age brilliant minds coined technical projects with social utility, such as flying machines (R. Bacon) or logical machines (R. Lull). The Renaissance period is full of intellectual inventions, physically realized only in our days, like the utilitarian ones (of industrial or personal use) or of military destination machines made by Leonardo da Vinci, like the automatic loom or the multipurpose war machine.

Other intellectual or practical creations were made in art, such as the birth of the bright sonnet in the warm, but anonymous south, alongside the glass artifacts, when in the gloomy north the development of modern tragedy stands out (realized perhaps by Francis Bacon as Shakespeare), as well as the coming into use of the banal button. See, for more (White, 1990).

In his turn, A. Kircher was not only a scientist. As Leibniz, he was a global acting creator and communicator. He had a great success not only with his cryptographic works, but he also invented an image-projector, a magnetic clock, as well as a lot of more or less sophisticated automata.

Inventors who followed them conceived and presented various automatic devices or even more complex ones, especially with an entertainment destination. It seems that our civilization of spectacle is not the first at all; even the ancient Egyptians, the Greeks and Romans have used some religious, political or entertainment-centered complex, mainly natural laws-based artifacts.

A *machine-man* was even conceived by La Mettrie, who depicts a continuous analytic line that allows the study of human organism both as a plant-man and as a machine-man, integrated then in a cosmic and cybernetic connection. In his vision, the cybernetic constitution and conduct is both one internal and external, individual and generic (La Mettrie,1861). His famous idea, still picked up mainly by its spectacular feature, was preceded by that of Descartes, who elaborated a cosmological theory that describe a worldwide cybernetic mechanism.

Descartes and La Mettrie have then formulated cybernetic explanations for the organization and operation way of the world system, thus integrating the cosmic universe and the human universe in the succession of the regulatory and self-regulatory forms of organization. According to the doctor who was also a philosopher,

organization is the source from which both the psychic qualities of man and his social achievements arise, the organization itself coming from nature (La Mettrie, 182). Do not be forgotten that also Descartes had a dissection cabinet in Amsterdam.

Today, cybernetics can be seen as the general theory concerned with the efficiency conditions of human action. It is, consequently, an entire system of conceptions, hypotheses, experiments and actions made in the benefit of human communities.

As a system of activities, cybernetics regards the effective identification and implementation of adequate instruments for social system's development orienting, coordinating and control. Therefore, it can also be conceived as the general theory of systems with an oriented or even directed behavior, especially of those that can be described as evolving or even developing systems.

Cybernetics can also be seen as theory and practice with the purpose not only to envisage some present efficient social models, but also the best future social perspectives. A socio-cybernetic, but mainly socio-economic and juridical research group has been functioning, under the patronage of the economic section of the Romanian Academy, for decades in the country.

3. DATAMATION

Three centuries after Homer's histories, a new, more abstract direction of innovative thinking was born, with the sophists, as the Greeks called the sages of that time. They conceived language as a "technique of technics" and offered lessons for its effective use in different fields. Two centuries later, the representatives of the Old Stoic school invented the first elements of logical calculus. In their turn, Euclid's commentators made the synthesis of a lot of heuristic method. With the flourishing of Arab culture, Al Horezmī created working algorithms for any field of calculus.

The Medieval mnemotechny can also be integrated in this intellectual tradition, but another, more spectacular intellectual inventions followed. Thus, R. Lull coined the logical machine, an invention resulted from the idea to produce all the possible knowledge, by a mechanical method, presented in his *Ars Combinatoria* (1275). The materialization of this idea was a „machine" made of paper, that was effectively used for automatic but mechanical generation of the religious truth.

Much later, Pascal invented the first digital computer, named *Pascaline* (1645), in an attempt to help his father, who was an administrator, in his calculations. His mechanical computer followed in 1682. Descartes proposed the mental experiment of the "brain in the tube", and Kircher invented the artificial universal language, named *Polygraphia nova*, in 1663. Leibniz wrote his famous *Dissertatio de arte combinatoria* (1666), and Kircher added his *Ars magna sciendi sive combinatorica* (1669).

Later, Leibniz fulfilled his promise made to the English Royal Society, that financed him, to realize a computing machine (1671). Then, he developed the binary computing system (1679/1701). More, Leibniz created *characteristica generalis* (1682), and studied mind by a large-scale model – „the mill" –, a model used later by Babbage and his softist, Ada Byron Lovelace, for the *analytic engine* (1837), the first programable computer, effectively realized in 1999 at the Smithsonian Institute.

A very intellectual invention can be examined if we follow J. Swift in his many but less known travels in imaginary but realistic depicted countries. One of these travels lead Gulliver to the Academia of Logado, where he found a *creation machine,* able to make, for humans without specific competencies, just like our computer, poetry, mathematics, legislation or even philosophy.

Even in this, mainly abstract research and activity field the necessary theory-practice unity becomes obvious. Thus, an important Romanian performance was MECIPT-1 (Electronic Computing Machine of the Polytechnical Institute of Timişoara), a computer with electronic tubes and memory on magnetic roll, designed and built in three years (1959–1961), but finalized in the next eight years and characterized even by its main creators (D. Farkaş and Şt. Măruşter) as representing "a historical page in the field". 1961 was the year of finishing the hardware of computer (central unit, memory, peripheral devices etc.).

Rudiments of the operating micro-system were built in several years (1961–1969), with components such as an I/O supervisor (input both for numerical data and programs, output for numerical data) and Translators and Compilers (both for a specific assembly language and for a high-level language like FORTRAN) as well as a Mathematical library.

In 1968 was designed and achieved one of the first translators for a specific assembly language in our country, named *Autocod*, by a team with D. Farkaş as the main designer. The initial team included a mathematician, an engineer and a technician; the leader of team was I. Kaufmann, mathematician and lecturer at the West University of Timişoara.

MECIPT-1 was utilized mainly in designing and research works: most of the calculus for the cupola of the National Exposition Center from Bucharest, for the Vidraru dam and for the "Iron gates" on Danube or the water network of Arad. It was also the main computing instrument to design power machines used at UCM Reşiţa and for computing the gravitational anomalies in the Petroşani basin for geological prospecting

DACICC-1 (Automatic Computing Device of the Computing Institute of Cluj), created in 1961, was a second-generation computer if we consider its technical infra-structure (it was completely transistorized). As a soft product, it was conceived and organized in mnemonic program structures, built on the basis of mathematical modeling methods.

Trough intellectual techniques assisted by information technologies new forms of knowledge have been constituted and even artificial knowledge is promoted, as shown in (Pană, 2004 and 2005). Moreover, not only artificial intelligence or artificial life are explored and experimented, but even the growth of the artificial intellectual environment (Pană, 2005–2006) of the "society of mind" is described.

4. SOCIOMATION

The above envisaged concise, both post- and predictive sketch of certain significant steps in the process of the automation of some physical or intellectual activities and operations can also be considered a historical and theoretical ground

or foundation for the further considerations about the common, present and future evolution of natural (human) and artificial (technical) social agents, historically, technically and spiritually united today in a common history.

A technical infrastructure is now present at each structural level of the social system and, in our times, mainly by the information technology, developed as an answer to specific social changes (Dobrescu, Dobrică and Popescu 2009, 85–90). The technical activities, means and methods used at all structural levels of the social system, generate a retroactive influence that becomes the main motive force of social evolution.

But this determining influence of technological infrastructure is exercised by the complex institutional structure and by the intellectual superstructure: it is then facilitated, mediated and conditioned by these constitutive levels of the social system.

As we need complex scientific studies and even a philosophical foundation to create an appropriate social model able to explain the complex interactions of social and technical components of the socio-technical system, we also can be helped by the identification of some successful generative structures that can be discovered by a historical perspective on the technical culture.

4.1. Social invention

Social, but mainly theoretical inventions can be registered in all the three periods passed, each of which proposed a reconstruction of humans, in body and soul, collectively and individually. A lot of social constructions built as ideal models and presented as ucronias or utopias were coined. These intellectual inventions were also described like human or geographical curiosities, not like the old platonic city, a mind-made place based only on words, as the philosopher himself said.

Here can be nominate again Francis Bacon with his *Nova Atlantis* as well as T. Campanella, with his circular and more, concentric organized ideal construction. Probably similar social ideas animated some plastic representations, like those entitled *Bononia* and sketched as stellar figures on imaginary maps, along the papal city corridors.

Instead, counter-utopias or dystopias appeared in large numbers, especially starting with the 1900s, curiously intertwined with science-fiction works. Nowadays, in continuation of the reaffirmation of the humanist philosophical current, the transhumanist and posthumanist tendencies are increasingly manifested, all of which having their own history, structure and characteristics, as well as their own value system, respectively carefully studied evolutions in already established schools of thought.

Under these conditions, it is not surprising that, once again, concerns arise for the reconstruction of humans, but not as an individual or society, but even as humanity, with another important difference: are taken into account not ideal means, descriptive or explanatory models, but the effective transformation of man, starting with his biological, i. e. vital level, by using biotechnical, medical and institutional means.

Today, technically created agents, processes or systems are not only artificial, automatic, intellectual and often virtual, but even social entities; they are sociomatic entities.

Social agents designing and implementing in real conditions is maybe the best example of the joint between the intellectual and the practical invention forms. The main forms and levels of intellectual invention were already studied in a dedicated paper (Pană 2006b, 1147–1164), including forms of social invention.

But sociological and psychological approaches become also necessary and, more, interdisciplinary in many ways, because some theoretical and methodological transfers between disciplines occur in this large and complex field of computer mediated cognition, communication and interaction. This interdisciplinary trend manifested among scientific and even technological areas must still allow the continuation of specialized studies

We can illustrate this necessity for the field under discussion by the observation made in the area of experimental psychology that the same functional images of the brain may be obtained when a real scene is followed and when the same event is only imagined by a person. For a more specialized approach we note some pertinent observation made in (De Angeli and Johnson 2004, 262–266) that the study and development of interacting systems need more than a focus upon superficial sensory level interaction.

New perspectives, but also new challenges appear with the technological possibilities opened by advanced intelligent artificial agents designing and using, able to interact even with the work and entertainment groups of kids and teens, maybe the most adapted to the virtual space (Keeling *et al*. 2009, 73–92). An educational neuroscience-based point of view regarding the present course of education process in the virtual school was presented in the Interdisciplinary Research Group of RCHPST, and is accepted for publication (Pană, 2023).

Other important aspects that reveal the complexity of the psychological analysis that can found successful steps in social agent's theory and practice were established by Sloman and Arieti who showed that emotion is not a special sub-system of mind, but it is a penetrating feature of the whole mind and that emotions are very concretely related to other psychological phenomena like cognition. It is obvious then that integrated psychological studies are needed even for handle a single psychological aspect in artificial social agent's generation and implementation.

4.2. Sociomatic studies and reflections

We are living and working today in/with technically created systems, processes and agents which are not only artificial, automatic, intellectual and often virtual, but even social realities: they are sociomatic beings.

New disciplines or even entire research fields were initiated as answers to the necessities of this domain of study and activity. These research fields can themselves be seen as a scientific and philosophical system and more, they can be envisaged as having a hierarchical structure and a fast evolution.

At the most general and abstract level Cognetics, Intellectics, Inventics, Technics, Pragmatics and Prognostics can be classified and placed. All these are cultural units with different degree of complexity that have their own internal structure, made of less general and more practical disciplines.

Such kind of domains and disciplines are Sociology of science, Cognitive psychology, Sociology of technique, Sociology of culture and Sociology of communication, Artificial ethics, Ecosophy, as well as Prospective studies, techniques and activities

All these can be together integrated in a new cultural whole here indicated under the generic name coined by us, that of Sociomatic systems, studies and reflections, many of them being saturated by various types of action-centered philosophical perspectives.

The new area of Sociomatic studies and reflections represents not a sum of the results obtained in the mentioned new groups of disciplines and activities, nor a synthesis of several new interdisciplinary approaches, but it constitutes a new cultural body brought by joining of some theoretical, methodological and applicative approaches of scientific, technical, ethical, aesthetical and ecological kind.

Each perspective involved in these scientific and technical projects is developed in many forms and at several levels. Thus, ecological activities regard economical but also social, cultural and even spiritual problems and are both theoretical and practical; the contemporary evolution of ecology culminates by the birth of ecosophy.

This later is not directly preoccupied about eco-spasm or eco-cide phenomena but it is dedicated to solve essential, metatheoretical problems. The research field of human and artificial agent's interaction can be placed, from this ecological perspective, in the area of Social and Cultural Ecology; in this context, the artificial environment created by computer and internet-supported activities and communities can be considered as an extension of the former artificial environment, that added by humans to the nature: the social environment.

Recently, our cognitive and actional powers were put to the test by some new human pathologies which evolved into social pathology when institutional instruments of global magnitude were used to solve huge medical, pharmaceutical and logistic urgencies and even religious dilemmas, under stress, fatigue and fear conditions, installed in absence of clear and credible knowledge. See also (Nadin 2022, 152).

The system of cognitive and reflective achievements able to found, to motivate and to evaluate the practical activities dedicated to increase the social and human efficacy level is based mainly on meta-theoretical studies of scientific and technical kind, which outline the sociomatic research field, initiated and explored in (Pană, 2006a and 2006c) from various perspectives and at different levels, with instruments honed over millennia and with others invented by the new gods of technology.

4.3. Conceptual and pragmatic evolutions toward sociomation

Those interdisciplinary approaches that are involved in the generation of the described new socio-technical area – the domain of Sociomatic systems –, analyzed in the second and third sections of this paper, as well as the shortly presented

dedicated body of studies and reflections, can be continued by more concrete and practical studies that integrates and applies these previous aspects.

Thus, a psycho-pedagogic and psycho-sociologic approach can be developed in the study of the new, artificial technical environment in which both human and artificial agents, as well as human-artificial agents interact in common, cognitive and practical activities, with the task to prepare humans for cooperation in this environment and to "teach" robots to preferentially interact with humans.

Much more advanced intelligent agents, sometimes called "social agents" are prepared not only to assist people in mainly cognitive professional activities, but also to interact with them in the most different types of activities, starting with educational and sanitary ones, continuing with those from services and transports, adding the banking and administrative activities, but also those of artistic and entertainment type.

Through such kind of common activities, initiated in following identical goals, carried out with some common instruments and technologies, in an artificial environment, both human and artificial agents gain new and common components, behaviors, features and … needs, artificial too.

The present human and artificial intelligent collaborative agents can be identified as being:

► individual entities (complex, specialized, autonomous or self-determined, even unpredictable ones);

► open and even free conduct performing systems (with specific, flexible and heuristic mechanisms and procedures of decision);

► cultural beings: the free conduct gives cultural value both to the action of the human being and the artificial one;

► systems open to education, not just to instruction;

► entities with "lifegraphy", not only with "stategraphy";

► endowed with various or even multiple cognitive skills and techniques;

► equipped not just with automatisms and intelligence, but also with beliefs (cognitive, evaluative and affective components of psychic life, which is present, even as a component of artificial life);

► capable even of reflection, as a consciousness form;

► components/members of some real (corporal or virtual) communities.

Therefore, human and artificial cognitive and active intelligent agents can be considered as being co-generative, co-functional and co-evolutive. In these activities, properties, functions and mindsets lie both their present strength and their common future.

The sociological and psychological approaches undertaken in order to support and develop the above-described "intelligent society" can be accompanied or even led during this effort by a series of possible branches of sociomation, such as Change detection, Change management and Change prevision. See (Pană 2009) and (Pană 2013).

Present-day knowledge flows and nets, stores and markets as well as the virtual work groups and communities constituted on the web are a few forerunners of the processes, structures and activities which will characterize the functionality and

dynamics of the future society. This one will be a sociotechnical system too, but a system based on new spiritual, intellectual and instrumental means, in turn able to manage social change and to direct social evolution starting from a cultural model, studied and applied by social means and technologies, it becoming in this way a sociomatic system.

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PLASTIC ART, ORDER AND CHAOS EXISTING BEYOND THE "SPACES" OF MATHEMATIC INSTRUMENTALISM

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Abstract: The text of the following essay is "building" an imaginary dialogue which aims at describing possible relationships that might occur between plastic art and the triad: complexity-biocomplexity-psycho-complexity, and also between plastic art and complicativity, order, determinist chaos, system and bio-system, neuronal and mental correlates (bio-psychology + psychology), "neuroscience" disciplines, epistemology and philosophy of science, neuro-philosophy, chaordicity, and others, all understood in the framework of the existence of a current mathematic instrumentalism. In the end, there are some references to the pentad: "neuronal-mental-chaordic-psychological-plastic arts", a group with holistic (Quine type) forms.

Keywords: plastic art, complexity-bio-complexity-psycho-complexity, epistemology, mathematics, chaordicity.

I would like to organize the paper (also giving it the title "Plastic art, order and chaos existing beyond the "spaces" of mathematic instrumentalism") into six "segments" (rationally) conceived, as much as the space and time. These are: a) Complexity, complicativity and plastic arts. Formal limits; b) Order, system and plastic arts; c) Chaos and plastic arts; d) Neuronal and mental correlates existing within a duality opposing to or in agreement with plastic arts; e) Examples of chaordism existing within plastic arts; f) The pentad neuronal-mental-chaordic-psychological-plastic arts. Suppose as known the primary elements referring to complexity, complicativity, limits, bio-complexity, psycho-complexity, feedback, feedbefore, order, physical system, biological system, chaos, determinist chaos, neuro-mental correlates of consciousness (conclusions within some current "areas" of science in biology, medicine, "neuroscience", cerebrology, theory of mind, informatics, bio-informatics, theory of information, modeling, philosophy, neuro-philosophy, epistemology), continuity-discontinuity, thinking of chaordic complexity, plastic arts. I would like to remark that currently, we can only "trace some minimal lines" some personal ideas, be they initializing, but, at the same time, sufficient for further interesting developments.

A) COMPLEXITY, COMPLICATIVITY AND PLASTIC ARTS. FORMAL LIMITS

Within the relationship between complexity (bio-complexity), complicativity and plastic arts, we find some macro-physical level characteristics, such as:

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non-linearity, order, determinist chaos, neuro-mental, chaos, correlation, self-organization, emergence, becoming, information and others. I think there are some "images" that may be included into structural psychologism existing while perceiving plastic art works, more from the exterior "space", but also from/within a proper "spaces" of which, not once, those directly involved in the "artistic emanation" are not considerably aware or not concerned with. In this case, complexity is characteristic to the perception of artistic achievements, by the participation of some exterior human beings, not directly involved in a certain artistic product; awareness of complexity comes rather seldom from/within the interior, from/within the effective "space" of "building" the artistic product. We may find this situation both as concerns painting, sculpture, graphics, drawing, and in architecture... Complexity has certain limits of understanding also analyzed mathematically; surpassing those limits implies man is lacking its perception and understanding (limit of fundamental perceptions proper to human beings). Complexity is different from complicativity: the former occurs (exclusively) within the physical process, and not at all as a phenomenon.

If we consider plastic art as representing, in fact, a physical process, to which we may also add a particular mechanism of making, there will be a complexity comprising the former, however, in a phenomenal, real situation, as far as this is understood, there will be, in fact, a complicativity proper to a (unique) creation, which generates aesthetic forms and which has symbolism and beauty. In what concerns the creation deed, in general, but also in the framework of plastic arts, I would place myself to consider its existence on a phenomenological level and not on an epistemic one, with metaphysical nuances. At the beginning of this presentation, I remarked the level macro-physical is under discussion, and, if the analysis were achieved also at the micro-physical level, aspects would change and would become more complicated, from the ontical and maybe from the ontological point of view, in a dramatic way or, in fact, probably in a "real" way. A central issue in current science consists in finding an "area" where the shift from micro-physical to macro-physical, from micro-physical discontinuity to macro-physical continuity takes place.

Consequently, we should search for a "real" identification of the situation also existing within human perception, no matter the later is exercised over abstract or common areas. The point-counterpoint ideas in music, chaos (from the psychological point of view) – determinist chaos (as accepted in mathematics), and others (e.g.: order-chaos), may be analyzed (since they exist) also as concerns plastic arts. Effects cannot be controlled sufficiently well, even within complexity (or complicativity). Sometimes, the latter contain a certain degree of coexistence, even harmony, even though, they (apparently) come from certain conflicting ideas. To really control "turbulence" is an (ontical) illusion (including in the physic of continual environments, but also in the physic of continual environments and in the social one – here, come, in fact, arts, sensitively-generated by means of perception). It was alleged, however, that Vincent van Gogh came to render complexity in his paintings. Further on, I will use more the term of complexity, although I had previously justified my opinion according to which the proper term for the outcome of plastic arts would

be complicativity. Therefore, would be avoided the possible mechanical form of complexity, which sometimes occurs in physics; art means more...

B) ORDER, SYSTEM AND PLASTIC ARTS

Order is associated to entropy, information, the Boltzmann measure. There is a relationship between complexity and order, the way to organize a painting, a sculpture, a piece of architecture, a drawing, where there is, in fact, a certain degree of order. Parameters – sometimes invariable – can be associated to order. In a system (where we may include also the artistic products) we may admit there is a degree of order, which characterizes its level of organization. Any system involves organization and structuring, entry sizes, exit sizes, classes that include specific functions (entry, exit, transition) and others. Within a certain painting, upon a deep analysis, we may realize there, is, in fact, order, organization and structuring that we apparently are not aware of. Consequently, that painting might be framed into a system (by means of style and others). I think it is the same with sculpture, even with drawings and graphics. Systemic entry sizes are represented, in the given situations, by what the author of the respective artistic work has thought, as its generator, while the systemic exit sizes refer to the results of the respective work and they are discussed by the critics in the domain, by those who watch a certain painting, sculpture or drawing.

The same situation is true in the case of complexity (complicativity) which, sometimes, is dominant. To the extent to which the existing order in a painting, sculpture, drawing, graphics can be identified, the entropy involved is reduced, and information has high values. Therefore, we can admire M.C. Escher's drawings and graphics, which are apparently complex but have order as concerns image, as far as they are correctly understood. The works of Brâncuși also impress us by their simplicity, while, at the same time, they have a high level of complexity (complicativity), if we properly understand them. Innumerable contradictions may occur out of an improper understanding, as Constantin Brâncuși himself experienced, at a certain time, during his life. The system entry pertains, thus, to the artist, as located within their inner "space", while the system exit pertains to the outer "space" to results and to those included to the latter: sometimes, there is a feedback or even a feedbefore.

C) CHAOS AND PLASTIC ARTS

Chaos represents primitivism and lack of organization; it's different from determinist chaos in mathematics. There is a manifestation of determinist chaos, by means of which an apparently stochastic, aleatory behaviour, can be molded by a system of non-linear differential equations, describing the variation in time of a physical system, but without any implication of hazard. Fr. Cramer considers that there is an order within determinist chaos, while Stephen Kellert declares that finding a chaotic-determinist behavior justifies the conclusion according to which order has

been found within the former. The conclusion is that mere chaos does not imply order and organization, unlike determinist chaos, which ensures order within phenomena generally taking place within a system – mostly nonlinear – with a dynamic complex form and sensitivity, added to instability as concerns the initial conditions. If we include plastic arts into a mathematic system that has determinist chaos, properly organized, of which, in most situations, the artist is not aware, an interesting fact will result: paintings, sculptures, drawings, graphics will have a certain "space" of their own, characterized by the order existing within the so-called chaos, probably a mathematic determinist chaos elaborated based on criteria that differ from the previous ones. A point will be catastrophic (Dr. René Thom) when a discontinuity occurs within it; thus, a catastrophe will take place (a metaphoric name given to certain mathematical forms, for a good suggestion of language), a fact generating a form. That point is different from a regular point, where ordinary processes will take place.

Beyond maximal complexity – too little or even not at all understood by a human being, will occur the chaordic. There is a certain point or an area of discontinuity, during the shift from complexity (complicativity) to chaordicity. Sometimes, certain artistic works inferred within plastic arts may also have a tendency towards chaordicity. The former will not generally pass over the limits of a complex system. R. Thom (he was granted the Fields distinction, the equivalent of Nobel in mathematics) stated that the theory of catastrophes, which he had built, "presupposes the things we see are mere reflections and, in order to reach their real existence, we should multiply the abstract space by an auxiliary space and, within the latter, we should define the simplest real existence which, by its projection, will become the origin of the observed morphology". Observing a phenomenon is, in fact, a reflection of an abstract model, achieved on a supporting space. According to the above ideas, what is represented in a certain painting or sculpture is just a reflection, a mere projection. In order to access their real existence, we should create an auxiliary space (also named support), where we should define the simple existence of the respective object.

The effective space of the painting, sculpture or drawing where the artistic work is achieved represents a projection that contains the origin or a morphology. These daring and profound hypotheses are leading us to paragraph d) of this essay. A question (for the time being, rhetorical) that may have a certain consistency is however to be asked: to which extent the correlates we shall refer to are justified within those auxiliary spaces, which, in fact, "are hosting", the mind of the respective artist, sometimes unsufficiently understood by some of those around them? Sigmund Freud could formulate an answer and if, that answer, by means of an imaginary exercise, could fit into the current period of time, so much the better.

D) NEURONAL AND MENTAL CORRELATES EXISTING IN DUALITY OPPOSING TO OR IN AGREEMENT WITH PLASTIC ARTS

The previous issues are making the shift towards the next ideas, proper to the current paragraph, and with echoes towards the next two. Currently, there are some hypotheses (certain researchers declare them as certitudes) concerning the

difficult issue of <u>consciousness and mind</u>, implied by the results in domains such as: "neuroscience", neuro-philosophy, neuro-psychology, pan-psychism (quantum) and others. Names such as David Chalmers, John Searle, Thomas Nagel, Saul Kripke are well-known: their clear-cut opinions referring to those two big issues are, in fact, triggering new questions. Also, currently, some essential research is being made upon the brain, like those pertaining to the Blue Brain Project in Lausanne, BRAIN in USA, financially similar to those at CERN Geneva (the existence of the Higgs boson, proved in 2012). <u>There is, now, a rising tendency towards the idea according to which, both consciousness and mind represent the effect of the emergence of the cerebral neurons, a process taking place (exclusively) within the cerebral cortex (prefrontal cortex), by means of numerous inter-neuronal connections (chemical-electrical synapses) that can be found at the level of the former (codified cerebral process)</u>. It results that the two admirable "capacities" of the "live intelligence" are, in fact, a cerebral neuronal agglomeration that implies neuronal correlates, all our achievements, artistic and aesthetic emotions, behaviours, are representing the effect of those correlates.

John Searle states that anything different from that opinion is an anecdote. We find it difficult to accept, difficult enough... However... The "hard problem" is to identify, as exactly as possible, the "border" where, by means of that agglomeration, takes place the shift (by means of billions of cerebral connections existing at the level of neurons in the cortex) towards the appearance of consciousness and mind or, in other words: starting with which level of the number of neurons proper to the cerebral cortex appears the subjective inner experience? It is a way of thinking similar to the one we are using when we want to identify the "border" where the shift from microphysical ► macrophysical, from discontinuity to continuity takes place. Under these circumstances, it results that plastic art works, by means of consciousness and mind, are the effect of the above-mentioned correlates. The reality of the brain, by means of the cerebral cortex neurons, is creating certain representations which, more than once, do not correspond to the real structures of Nature. Since that (inner) reality has a particular form for each of us, the previous statement is justified also for the results of arts, in general, including plastic arts. The statement is also justified in what concerns valuable music (probably the classical one). We come back to plastic arts. There are situations when certain neuronal deficiencies (the usual interpretation) of some great artists had some effects upon what they achieved (sometimes, great achievements) in their works (painting – Vincent van Gogh, Francisco Goya, Jackson Pollock...), and not only...

Rhetorical questions: did those deficiencies – sometime significant – place those artists, by means of their mind, in the auxiliaries "spaces" to which René Thom was referring?; to what "areas" were the artists directed by such "spaces", by means of their magnificent works?; were they consensual to those spaces or did there exist a kind of opposing duality?; can there be identified, however, a "mental space", even under the current circumstances or that idiom is a metaphor?; were there any specific forms of chaos, proper to the pshyche of those artists or, in other words – were they surrounded by a non-determinist chaos, different from the determinist mathematic chaos? Probably yes. I think the respective "areas" are part of a "chaordic" system

that surpasses the maximum complexity of the level of the determinist chaos. In fact, a placement superior to the mathematic instrumentalism is occurring. I am stating this, based on the fact that their respective works contain also a significant order, not only the chaordic chaos. Thus, will simultaneously appear both order and chaos; the latter, however, is differently structured (or, maybe, even non-structured) as compared to determinist chaos. I don't think that, currently, mathematics can quantify it. Maybe, in the future, it is going to be possible. I think some forms should be found which may comprise both components, not just one (the determinist chaos), since they are (only) apparently contradictory. The dynamics of non-linear systems could represent an answer. Also, the theory of information, by means of its simultaneous forms (the Claude Shannon statistics, syntax, semantics, pragmatics and apobetics). There are numerous situations when there have been equilibrated creators, who produced artistic works of great artistic refinement, without having any deficiencies (e.g.: bipolar syndrome, depressive forms, schizophrenia...). Nevertheless, with some great creators, included some placed within plastic arts field, some of the previously mentioned situations could be framed into the category of neuro-phychic "disorders", deficiencies that have accompanied them (or that they have developed) during their entire, lives, unfortunately. The need to compensation directed them, however, earlier or later, in their existence, towards performance, within a domain/some domains where they were able to achieve maximum results, by their perfect talent and a continuous exercise (maybe, sometimes, subjective). There still remain many questions and few answers.

E) EXAMPLES OF CHAORDISM EXISTING WITHIN PLASTIC ARTS

There have been some examples considered within plastic arts, where the works within may be included into chaordism; they simultaneously have different degrees of order and chaos. I would like to refer to a few representative paintings and graphs, such as: "The Small Babel Tower" and "The Big Babel Tower" – Bruegel (Elder)'s works, found within two representative museums in Rotterdam, and Vienna, respectively. Also, "Confusion of Languages" (spoken), the work of Doré, and another "Babel Tower" – Escher's work. If, in the first example, we can remark a "vertical" joining – as an image, between order (the inferior area of the painting, passing the beyond the centre) and chaos (the superior area of the painting, neat the maximum height), in the second example, we may find a certain order (the left half of the painting, from bottom to top), while the right half is suggestively describing chaos (from bottom up to the top, in its whole): in this case, there is, in fact, a "horizontal" joining – as an image, between order and chaos. The two painting are inspired by the Old Testament (Genesis). With "Confusion of languages" Gustave Doré suggests, first of all, social chaos resulted from fact that people lacked the understanding of spoken languages (horizontal level, within the bottom area). His Babel Tower, as a building image, is represented somehow in a certain order "not surrounded" by chaos. Architectures, as well as buildings don't include chaos, most of the time, unlike society, where chaos appears often, and is non-determinist (non-mathematical).

However, architectures/building are achieved by people, and some of them are admirable works of art, and not mere buildings (my own reflections). Supra-realistic images in Escher's graphic may be framed within the complexity of determinist chaos, of mathematics, and they tend (sometimes) towards certain chaordic areas. In fact, the Dutch artist was the graphic artist of ideas taken from pure mathematics and much lesser from its applied forms, or even from the social domains. "His Babel Tower" has geometry and organization (as rendered by the described image, considered from bottom to top), and a certain chaos can be identified only towards the border of the image, in the superior area of the latter. We can also admire, in the works of Cornelis Escher, the two lithographs with the titles "Order and Chaos I" (1950), "Order and Chaos II" (1955). With the first of them, order is put into evidence by the stellar dodecahedron made of crystal and the transparent sphere in the centre of the image (their geometry has symmetry/equilibrium and can be evaluated by means of methods specific to algebraic geometry); it is in contrast to the environmental chaos, spread within the circumference of an imaginary circle, formed out of different scraps of some (ordinary) objects, without any minimal connection among them. We can find a copy of that lithograph in the album "M.C. Escher, *The Graphic Work* – Introduced and explained by the artist, Ed. Taschen, 2007, p. 59). With the second lithography, chaos appears so very shocking, as it is rendered in the former one, while order is rendered, however, also by means of centred stellar crystal, circumscribed to certain geometrical images including order and symmetry.

Had Escher lived in the year 1993, when Dee Hock introduced the term "chaordic", he would probably named his two works "Chaordic I" and "Chaordic II", respectively, like Anderson, for the term "emergence" within the theory of complexity. We may remark the fact that, in all those situations (works by Bruegel, Doré, Escher), we have to determine the quantity of order, as well as the quantity of chaos, and not just remark their existence. Within the Conference of 13th February 2020, held at the Scientists House ("Casa Oamenilor de Știință"), Romania, Bucharest, I (intuitively) achieved a graphical work with two exponential curves that I identified, explained also by means of certain calculation relationships (differential forms); my opinion was that order could be expressed by means of an ascending exponential curve, and chaos – by means of a descending exponential curve, chosen from the family of exponentials in mathematics, with a certain point of intersection, where order and chaos are equal. I also considered the situation when order and chaos might be artificially introduced into/extracted from a physical system, like they are currently doing in order to obtain supra-conducting materials, at negative temperatures. Those incipient analyses might be taken into consideration within optimal dynamic systems attached to the chaordic theory. Further on, I somehow went deeper down with that idea, and in the next period, I will be able to formulate the hypothesis in more detail, on three-four pages (for the time being). I start from the idea that chaordic is not the same as hazard, in the depths, and it is necessary that it is considered and expressed.

F) THE PENTAD NEURONAL-MENTAL-CHAORDIC-PSYCHOLOGICAL-PLASTIC ARTS

Paragraph f) ends the current opusculum and reunites, in a pentadic aura, the five previously analyzed aspects, while the general framework is represented by plastic arts. I think we could have a related discussion with a classical music background. A natural/final conclusion of these lines would be to join the five aspects with holistic forms (Quine type) into a group. Philip Anderson, who was granted the Nobel for physics (1977), in a (much quoted) article written in 1971 and published in 1972 ("More is Different") was supporting emergence, although he didn't provide a definition of it and, (later on) he showed that, at the respective time, he was not familiar with the term, but, as a physician (of significant performance) he had always considered the superiority of the emergent system, as compared to the one described by reductionism. Together, the component parts of an emergent system can achieve more than one by one separately, in isolation. Sometimes, emergence has certain attributes of undoing (braking) of the apparent symmetry pertaining to Nature. It has another characteristic, too: in a physical system, its occurring takes place within a level where the forms previous to the evolution of the phenomenon within the system are not known, in fact, the same phenomenon but existing in another form, on a level inferior to the one where the former (?) effectively appears and is visible. Emergence implies non-linearity and, when it is present, it is the result of a very large number of components and, at the same time, it generates the shift of the system to a superior level (by means of quality). It obviously has other characteristics, too. The appearance of mind and consciousness might be justified, and thus we could accept a neuronic, cerebral emergence, existing at a certain time, at the level of the cortex (of the form Searle and others). Maybe some other expressions should be introduced, such as "chaordic psychologism", where we could possibly include certain analyses of some neuro-psychic deficiencies, achieved, however, from a different "angle" than the previous one, which we could name as "classical". The previous statements refer to the pentad constituted as a conclusion for the "whole" of those lines built on the general framework of arts. For the rest, all the auxiliary considerations of paragraph f) result from what was previously presented.

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HISTORY OF SCIENCE

LE MATHEMATICIEN PETRE (PIERRE) SERGESCU
HISTORIEN DES SCIENCES, PERSONNALITE DU XXE SIECLE[1]

ALEXANDRE HERLEA[*]

Abstract: The mathematician and historian of science Pierre (Petre) Sergescu was a high-level personality of the twentieth century, both by his professionalism and by the ethics that characterized all his actions. He was also an excellent organizer and a committed intellectual, promoter of the great European values and attached to its origins.

Pierre Sergescu has played a leading role in the development of the history of science and technology, both in terms of content and its institutions internationally. In the latter field he was the "driving force" in the development of the international collaboration in the History of Science and Technology. He played a main role in the resuscitation of *IAHS (International Academy of History of Sciences)* of which he was President and Perpetual Secretary and acted for the establishment of the *UIHS (International Union of History of Sciences)* of which he was General-Secretary. He was also editor-in-chief and director of the *"International History of Science Archives"*. He also developed many other activities in the field of science, its history, teaching, and dissemination.

After the Second World War, in Paris he played a key role in the life of Romanian emigration: denounced the Soviet occupation of Rumania, the terror established by the communists and highlighted the profoundly European character of this country. He was the President of the *Association des Roumains Professeurs des Universités* in Paris, the President and General Director of the *Fondation Royale Universitaire Charles I* and was dedicated to the assistance of refugees (member of the association *Caritatea Romaneasca – CAROMAN*).

Keywords: History of Science and Technology; Mathematics; History and Philosophy of Sciences; AIHS-International Academy of History of Sciences; ICSU-International Council of Scientific Unions; Fondation Royale Universitaire Charles I; CAROMAN-Caritatea Romaneasca; Romanian Exile.

Chers collègues, chers auditeurs,

Comme le titre de ma conférence l'indique je vais vous parler du mathématicien et historien des sciences Pierre (Petre) Sergescu (Photo 1), dont nous célébrons cette année les 130 ans depuis sa naissance. C'est une personnalité lumineuse du XXème siècle, tant par son professionnalisme que par la déontologie qui ont caractérisé toutes ses actions et prises de positions. Il a été un mathématicien et un historien de haut niveau et en même temps un excellent organisateur et un intellectuel engagé, promoteur des grandes valeurs européennes et attaché à ses origines.

Photo 1.
Petru (Pierre) Sergescu

Pierre Sergescu a joué un rôle de premier plan dans le développement de l'histoire des sciences et des techniques, aussi bien au niveau du contenu que de ses institutions sur le plan international. Dans ce qui suit je vais m'arrêter davantage, sur ses réalisations dans ce domaine que sur les autres aspects de sa prodigieuse activité, celle de mathématicien, de dénonciateur des systèmes totalitaires et de personne impliquée dans la vie de l'émigration roumaine anti-communiste.

Né en Roumanie, le 17 décembre 1893, il a fait une partie de ses études en France où il a vécu de longues années; il appartient à cette pléiade de roumains dont l'œuvre fait partie intégrante de la culture française et européenne.

Son attachement à la France s'est affirmé dès son plus jeune âge ; lors de la Grande Guerre Petre Sergescu, alors président de l'Association des étudiants de Bucarest, mène une action pro-française pour laquelle, après l'occupation de la ville par les Allemands, il est interné, par ces derniers, pendant 18 mois dans des camps. Lors de la Deuxième Guerre Mondiale il prend contact en Suisse avec la Résistance française et en 1946, après l'occupation de la Roumanie par les soviétiques, il se réfugie en France.

Petre Sergescu est né à Turnu Severin, ville portuaire sur les rives du Danube près des Portes de Fer, dans une famille d'intellectuels dont les aïeuls ont été présents, au 19ème siècle, dans la lutte d'émancipation nationale et sociale du peuple roumain.

Esprit encyclopédique, après avoir passé ses deux baccalauréats en sciences et langue latine au lycée de sa ville natale, il poursuit ses études, en mathématiques et en philosophie, à *l'Université de Bucarest* où il obtient les licences dans ces deux disciplines en 1916. La même année, il est aussi diplômé du *Conservatoire de Musique*.

Après la Guerre, il obtient une bourse et poursuit ses études à Paris de 1919 à 1923. Ici il suit les cours de *l'Ecole Normale Supérieure* et ceux de la *Faculté des Sciences* de la *Sorbonne* où il obtient, en 1922, une deuxième licence en mathématiques et commence à travailler à sa thèse de doctorat. Il suit aussi l'enseignement en histoire des sciences de Pierre Boutroux au *Collège de France*.

En 1923, de retour en Roumanie, Petre Sergescu

Photos 2 et 3. Petru Sergescu étudiant

passe, à *l'Université de Bucarest*, l'agrégation en mathématiques et une brillante thèse avec un sujet du domaine des équations intégrales, intitulée «*Sur les noyaux symétrisables*» dont le directeur est Traian Lalescu. Paul Montel, le grand mathématicien français précise: «L'étude des noyaux symétrisables des équations intégrales avait déjà attiré beaucoup de chercheurs. Sergescu introduit la notion nouvelle de *noyau fermable* qui lui permet de regrouper les résultats antérieurs au sein d'une théorie générale». Ces résultats et d'autres sont publiés, dans les années 1923 & 1924, dans les *Comptes-Rendus de l'Académie des Sciences de Paris* et dans le *Bulletin de la Société des Sciences* de Cluj».

Immédiatement après, Sergescu commence sa carrière comme professeur suppléant à *l'Université de Bucarest* et à *l'Institut Polytechnique* de cette ville pour être nommé, en 1926, professeur agrégé de géométrie analytique à *l'Université de Cluj,* où, en 1930, il devient professeur titulaire. Il occupe ce poste jusqu'en 1943 quand il retourne à Bucarest où il est nommé titulaire d'une même chaire à *l'Institut Polytechnique* où il sera, à partir de janvier 1945, pour un court laps de temps aussi le Président. Entre temps il est élu, le 25 mai 1937, membre correspondant de *l'Académie Roumaine* et le 5 juin 1943, membre de *l'Académie des Sciences de Roumanie.*

Dans la période d'entre-deux-guerres Pierre Sergescu développe une riche activité, aussi bien en mathématiques pures que dans l'histoire et la philosophie de celles-ci. Cela tant au niveau de la recherche et de l'enseignement que de la promotion et la diffusion du savoir. Il est actif au niveau de l'organisation de diverses manifestations scientifiques et participe à la vie des institutions du domaine. C'est surtout le cas de *l'Académie Internationale d'Histoire des Sciences – AIHS*, dont l'idée fut lancée en 1928 lors du *Congrès International des Sciences Historiques* d'Oslo par Aldo Mieli et un groupe d'historiens des sciences et des techniques tels: George Sarton, Charles Singer, Abel Rey. Son siège sera, à partir de 1929, à Paris, 12 rue Colbert, dans l'Hôtel de Nevers, où elle est hébergée par le *Centre International de Synthèse*.

Dans le domaine des mathématiques contemporaines, Pierre Sergescu s'intéresse aux équations intégrales dont il s'est occupé dans sa thèse de doctorat, à l'algèbre, domaine dans lequel il a le plus publié, à la théorie des nombres, à la géométrie des polynômes, à l'analyse combinatoire, à la théorie des fonctions et quelques autres thèmes. Ses travaux sont publiés dans des revues scientifiques prestigieuses aussi bien en Roumanie (*Mathematica, Bulletin Scientifique de l'Ecole Polytechnique de Timisoara*, etc.) qu'à l'étranger (*Comptes-Rendus de l'Académie des Sciences de Paris, les Annales de la Société Polonaise de Mathématique,* etc.)

Sous le patronage de ses maîtres, les professeurs Gheorghe Titeica et Dimitrie Pompeiu, Sergescu fonde en 1929, la revue *Mathematica* (revue bilingue franco-roumaine) dont il est le rédacteur en chef et le principal sponsor. Sa contribution financière est essentielle assurant souvent la moitié du budget; 23 volumes vont sortir jusqu'en 1948. A cette revue collaborent non seulement des Roumains mais aussi de nombreux étrangers de haut niveau tels les Français: Paul Montel, Emil Picard, Maurice Fréchet et le polonais Waclaw Sierpinski. Elle atteste, dit l'historien des mathématiques René Taton: «*à la fois le haut niveau atteint par la science roumaine et la riche collaboration internationale que Pierre Sergescu a su lui attirer*». Elle a été, affirme Paul Montel: *«une Revue fondamentale des Sciences mathématiques»*.

Photo 4. Premier Congrès des mathématiciens roumains, Cluj 1929

Photo 5. Le deuxième Congrès des mathématiciens roumains, Turnu Severin, 1932

Petre Sergescu est aussi l'organisateur des deux premiers congrès de mathématiques qui ont eu lieu en Roumanie, à Cluj en 1929 et à Turnu Severin en 1932, auxquels prennent part des mathématiciens réputés, français, polonais, et d'autres. A ce propos, Paul Montel déclare: «*Le congrès de Cluj fut un grand succès. Celui de Turnu Severin par sa haute tenue scientifique, par la perfection de son organisation ... se termine d'une manière brillante*» (Montel 1955, p. 5–6).

Désormais connu sur le plan international, Pierre Sergescu est souvent invité à l'étranger principalement en France et en Pologne, pays avec lesquels il a des relations privilégiées. Et c'est normal, il est un grand francophile qui a fait ses études en France et sa femme, l'écrivaine Marya Kasterska qu'il a épousée à Paris en 1922, est polonaise avec des ancêtres français.

Photo 6. Petru Sergescu avec Marya Kasterska

Entre les deux Guerres, Pierre Sergescu séjourne souvent en France. Il est membre, depuis 1920, de la *Société Mathématique de France* et s'intéresse, à partir du début des années '30, aux activités de *l'AIHS*, dont le siège est à Paris; je vais y revenir. Il participe aussi aux congrès de l'*Association Française pour l'Avancement des Sciences – AFAS*, donne des cours et fait des conférences et des séminaires dans plusieurs universités françaises dont Paris-Sorbonne et dans des universités francophones de Belgique et Suisse. En 1937 il est, à Paris, le président du deuxième congrès des «*Récréations Mathématiques*», ce qui met en évidence le prestige dont il jouit. En 1932, la France lui décerne, en tant que professeur à *l'Université de Cluj* où l'influence française est très forte, la *Légion d'Honneur au grade de chevalier*.

En Pologne, Sergescu qui est membre de *la Société Polonaise de Mathématiques* est nommé président d'honneur du deuxième et troisième *Congrès des Mathématiciens Polonais* qui eurent lieu à Wilnio en 1931 et à Varsovie en 1937. Il parle polonais et entretient des relations privilégiées avec ses collègues. Il tient des cours et conférences dans plusieurs universités dont Lwow, et Varsovie; il est membre correspondant de la *Societas Scientarum Varsoviensis* et membre de la *Société pour l'Histoire et la Littérature de Pologne*. Il est décoré de l'ordre *Polonia Restituta*.

Mais ses relations et collaborations ne se limitent pas à la France et la Pologne; Pierre Sergescu participe aussi à des congrès et colloques dans d'autres pays européens, tels le *Congrès International des Mathématiciens* de Zürich, en 1932 et en 1937 à celui des mathématiciens des pays slaves à Prague.

Il faut souligner qu'à partir du début des années '30, son intérêt pour l'histoire des sciences, ne fait que croitre. En 1934, il devient membre de *l'AIHS* et s'y implique activement; il participe depuis à tous ses congrès.

C'est surtout dans le domaine de l'histoire des sciences que P. Sergescu s'est imposé sur la scène internationale. En 1933, à Varsovie, il est élu président de la *section d'Histoire des Sciences* du *Congrès des Sciences Historiques*. En 1936, à l'occasion de la réunion en Roumanie du *Comité International des Sciences Historiques* et avec l'appui du grand historien Nicolae Iorga, il organise à Cluj et à Bucarest, du 11 au 16 avril, une rencontre des historiens des sciences d'une dizaine de pays, dont Aldo Mieli, Charles Singer, Arnold Reymond, Mario Gliozzi. En 1937, au quatrième congrès de *l'AIHS* qui a lieu à Prague, il est élu vice-président, responsabilité qu'il gardera jusqu'en 1947 quand il en prend la présidence.

Dans le domaine de l'histoire et la philosophie des mathématiques et plus généralement des sciences, il aborde une grande variété de thèmes, publie plusieurs livres et de nombreuses études. Les principaux sujets abordés concernent: l'évolution de la pensée scientifique au Moyen Age en mettant l'accent sur l'œuvre de l'école scientifique parisienne (Paul Tannery, Pierre Duhem) ; les travaux des mathématiciens du $17^{ème}$ siècle et du début du $18^{ème}$, notamment la naissance du calcul infinitésimal, la polémique Rolle-Saurin au sujet du calcul différentiel (qu'il trouve dans le *Journal des Savants*) et autres aspects de l'école française dans la deuxième moitié du $17^{ème}$ siècle; la science à l'époque de la Révolution; le développement des sciences en Roumanie.

Parmi ses livres je cite: *Gândirea Matematică*, paru à Cluj en 1928 qui porte sur l'histoire et la philosophie des mathématiques depuis la Grèce antique au $20^{ème}$ siècle, couronné du prix de *l'Académie Roumaine* ; *Les sciences mathématiques en France au $19^{ème}$ siècle et au début du $20^{ème}$ siècle*, paru chez Denoël & Steele à Paris en 1933, dans la collection «Tableau du XXème siècle», élogieusement présenté par Emil Borel à *l'Académie des Sciences* de Paris qui lui décerne un prix; le chapitre sur les mathématiques françaises au $19^{ème}$ siècle dans le volume *L'évolution des sciences mathématiques et physiques*, paru chez Flammarion en 1935.
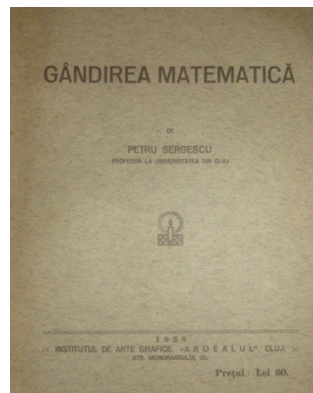

Photo 7.
Le tome *Gândirea Matematică*

Pierre Sergescu a publié aussi de nombreuses études dont une que je vais mettre en évidence est celle réalisée pour le Pavillon Français à *l'Exposition Universelle de New York* de 1939 intitulée: *Some important dates in the evolution of French mathematics*, publiée dans des dizaines de milliers d'exemplaires. D'autres que je ne mentionne pas verbalement, par manque de temps, se trouvent sur la diapo (vous pouvez lire les titres), ils correspondent aux thèmes de recherches déjà évoqués.

La Deuxième Guerre Mondiale avec ses horreurs et ses conséquences va bouleverser la vie de Petre Sergescu. À la suite du Pacte Hitler-Staline et au Dictat de Vienne, la Roumanie perd, au cours de l'été 1940, la moitié de la Moldavie et une bonne partie de la Transilvanie, dont la ville de Cluj où se trouve son université. La Faculté des Sciences de celle-ci déménage à Timisoara où Sergescu y reste 3 ans.

En novembre 1940 est assassiné le grand historien Nicolae Iorga, personnalité dont Sergescu était très proche. Face à ce crime, il retrouve le militantisme qui l'a caractérisé lors de la Grande Guerre. Il dénonce les crimes, vilipende les totalitarismes rouge et brun, fait une propagande active en faveur des alliés; il porte secours aux réfugiés polonais, et autres. En 1943 invité en Suisse par son ami Arnold Reymond, professeur à l'Université de Lausanne, président de *l'AIHS*, il prend contact, comme je l'ai déjà dit, avec les milieux de la Résistance française.

La fin de la Seconde Guerre Mondiale le trouve, comme on l'a vu, professeur de géométrie analytique à *l'Institut Polytechnique* de Bucarest dont il sera élu, en janvier 1945, président. Il y remplira cette fonction jusqu'en août 1946 quand il se réfugie avec son épouse à Paris pour ne plus jamais retourner en Roumanie. Il participe encore à Bucarest, en 1945, au troisième congrès des mathématiciens roumains.

Photo 8 *Le troisième Congrès des mathématiciens roumains*, Bucarest 1945

A Paris, Petre (Pierre) Sergescu va se consacrer à la science, surtout à l'histoire des sciences et à la Roumanie. Il passera des années dans des conditions matérielles difficiles; il ne sera chargé de recherches au *CNRS* qu'à partir de 1952, deux années avant son décès.

Au niveau de l'histoire des sciences, son action est prodigieuse, il devient le principal artisan de la collaboration internationale dans ce domaine.

Il faut préciser qu'à la fin de la guerre *l'AIHS*, principale institution de cette discipline, reprend ses activités. Elle souhaite bénéficier de l'aide que *l'UNESCO,* créée en novembre 1945, pourrait lui apporter et sait que celle-ci va soutenir *The International Council of Scientific Unions – ICSU* qui regroupe plusieurs grandes organisations internationales dont l'objectif est la promotion de l'activité scientifique.

Il semble que le grand sinologue, historien des sciences et des techniques, Joseph Needham, a eu le premier l'idée d'introduire l'histoire des sciences et des techniques dans le cadre de *l'ICSU.*

L'AIHS doit faire les démarches nécessaires et entamer des négociations. Mais, en automne 1946, sa situation est difficile : son secrétaire perpétuel Aldo Mieli est en Argentine, très malade, le président, Arnold Reymond, habite Lausanne et le secrétaire-trésorier J. A. Vollgraff à Leyde. Seuls deux responsables sont à Paris, où se déroulent les négociations, le vice-président, Pierre Sergescu et le secrétaire-adjoint Pierre Brunet archiviste-bibliothécaire. Ce sont eux qui entament, fin 1946, les négociations avec *l'UNESCO* représenté par Joseph Needham et Armando Cortesao et *l'ICSU* représenté par A. Establier. La solution qui se dégage est de créer une structure calquée sur le modèle des autres organismes membres de *l'ICSU.* Celle-ci va être «*l'Union Internationale d'Histoire des Sciences – UIHS*». Fin décembre le *Conseil de l'Académie* approuve cette solution qui bénéficie du support des personnalités les plus connues du domaine, telles: Ch. Singer, A. Reymond, (dont on a déjà vu les photos) G. Sarton, R. Taton ou M. Daumas.

Peu de temps après Pierre Brunet tombe malade et Pierre Sergescu reste seul en première ligne. C'est lui qui, à partir de décembre 1946, va jouer le rôle clef dans l'organisation institutionnelle de la discipline. Passionné d'histoire et de philosophie des sciences et des techniques Sergescu n'a pas seulement l'enthousiasme du créateur mais aussi la compréhension de la situation institutionnelle et la capacité de définir une stratégie pour agir efficacement. Il mène avec succès les négociations qui aboutiront à la création des statuts de *l'UIHS* et à la modification de celle de *l'AIHS* afin que les deux institutions existent et collaborent étroitement, grâce au lien statutaire établi entre elles.

Au cinquième *Congrès International de l'Histoire des Sciences* qui a lieu à Lausanne du 1 au 4 octobre 1947, la décision de créer *l'UIHS* est entérinée et Pierre Sergescu est désigné par l'Assemblée constitutive du 2 octobre 1947 secrétaire exécutif. Un jour auparavant, toujours à ce *Congrès,* lors de l'AG de *l'AIHS* il avait été élu président de celle-ci. *L'UIHS* devient membre de *l'ICSU* et Sergescu sera nommé délégué et en cette qualité il sera membre du *Conseil de l'ICSU*. Dans la photo qui s'affiche Sergescu écrit à sa famille en Roumanie pour annoncer son succès.

Photo 9 5ème Congrès international de l'histoire des sciences à Lausanne du 1er au 4 octobre 1947
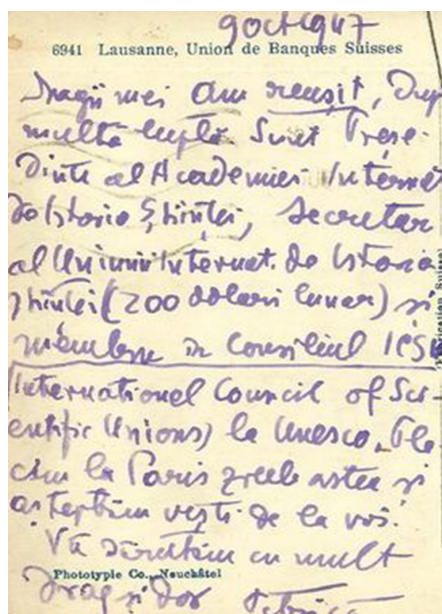P. Sergescu en 2e ligne 4e à partir de la gauche.

Photo 10 La lettre que Sergescu a écrite à sa famille en Roumanie pour annoncer son succès

Grâce à la création de *l'UIHS* et à ses liens avec *l'AIHS,* l'histoire des sciences se revigore et une revue dans le domaine va voir le jour. Le premier numéro de cette revue qui porte le titre «*Archives Internationales d'Histoire des Sciences*»

et le sous-titre «*Nouvelle Série d'Archeion»* parait en octobre 1947. *Archeion* le périodique de *l'AIHS,* créé par Aldo Mieli en 1929, avait cessé son apparition en 1943. Pierre Sergescu sera rédacteur des *Archives* et à partir de mars 1951 son directeur, fonction qu'il avait exercée de fait au moins depuis mars 1948.

Ainsi Sergescu assume seul l'administration et le bon fonctionnement des activités de *l'AIHS,* de *l'UIHS* et de la revue *Archives*.

Le 15 mars 1950, après le décès d'Aldo Mieli, survenu un mois plus tôt, Sergescu est élu secrétaire perpétuel de l'Académie. C'est la consécration. Pourtant ce grand succès fut éclipsé par la situation de la Roumanie occupée par les soviétiques; il avait espéré pouvoir organiser le sixième *Congrès International de l'Histoire des Sciences* à Bucarest, mais il aura lieu à Amsterdam en août 1950*,* la situation politique en Roumanie avait rendu ce projet irréalisable. Le septième *Congrès International de l'Histoire des Sciences*, le dernier auquel Sergescu participe, a lieu à Jérusalem en août 1953; à ce congrès il est le délégué de la France.

Il faut aussi mentionner qu'après le décès de Sergescu, les trois responsabilités qu'il exerçait au niveau de l'histoire des sciences ont été confiées à trois personnalités différentes : Alexandre Koyré est élu secrétaire perpétuel de *l'AIHS*; René Taton secrétaire général de *l'UIHS* et Jean Pelseneer directeur de la revue *Archives*.

J'ai insisté sur le déroulement du processus de création des institutions pour l'histoire des sciences et des techniques car il met en évidence les qualités d'organisateur hors pair de Pierre Sergescu.

A Paris, après la Deuxième Guerre, Sergescu développe aussi une série d'activités dans le domaine des sciences, de leur histoire, enseignement et diffusion. Il organise ainsi, à partir de 1946 et jusqu'à son décès, en 1954, les réunions annuelles de la section d'Histoire des Sciences de «*l'Association Française pour l'Avancement des Sciences – AFAS»*. Au congrès de Biarritz de 1947 il est le président du Département d'Histoire des Sciences et l'année suivante il participe à celui de Genève. On voit sur la photo la famille Sergescu à côté de celle de son ami René Taton.

Photo 11 A.F.A.S. Congrès de Genève, 12–16 Juillet 1948 (avec René Taton)

Il fonde aussi le *Séminaire d'Histoire des Mathématiques* à *l'Institut Henri Poincaré* et suscite la mise en place, dans le cadre de la *Sorbonne*, des cycles de conférences mensuelles d'histoire des sciences qui se déroulent au *Palais de la Découverte.* Ici il participe également à la réalisation des expositions aussi bien permanentes (comme celle sur l'histoire du nombre et d'autres sur l'histoire des sciences) que temporaires (comme celles sur Pascal ou Léonard de Vinci), toutes très appréciées.

Les cycles des conférences radiodiffusées par Radio-France auxquelles il participe sont très écoutés et jouissent d'une vraie notoriété. En 1950, par exemple, il a fait à la Radiodiffusion française 14 émissions sur les origines de la science exacte moderne qui seront publiées dans un volume intitulé «*Coup d'œil sur les origines de la science exacte moderne*». Livre à succès, paru à Paris en 1951.
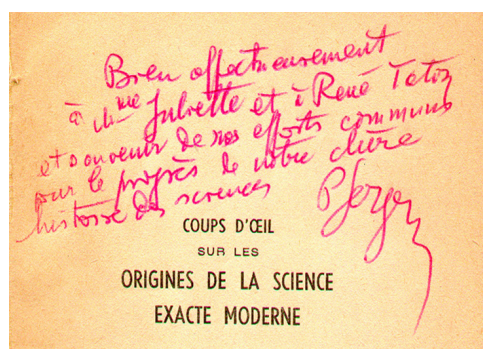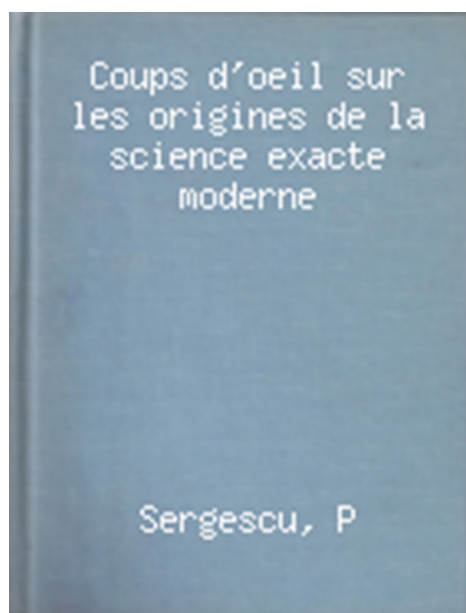

Photo 12 Le volume *Coup d'œil sur les origines de la science exacte moderne* avec une dédicace pour Juliette et René Taton

Petre Sergescu a beaucoup écrit, plus de 160 titres. Dans la première partie de sa vie, il a écrit surtout dans le domaine des mathématiques pures (plus de 50 titres); ensuite dans celui de l'histoire et philosophie des sciences auxquelles il faut ajouter des publications à caractère pédagogique et quelques autres.

Mais, en dehors de la science, Petre Sergescu s'intéresse aussi à la Roumanie et aux roumains exilés. Ce n'est pas une nouveauté car, il n'est pas un chercheur enfermé dans sa tour d'ivoire; c'est un intellectuel engagé, charismatique, bon organisateur et grand patriote roumain. Il refuse de renoncer à la citoyenneté roumaine pour ne pas laisser l'impression qu'il ne croit plus au retour de la démocratie en Roumanie, ce qui l'a empêché d'avoir un poste de chercheur au CNRS et a dû vivre dans des conditions particulièrement modestes.

A Paris, après la *Seconde Guerre*, il dénonce l'occupation soviétique, la terreur instaurée par les communistes et met en évidence le caractère profondément européen de la Roumanie. Il est le Président de *l'Association des Roumains Professeurs des Universités à Paris* et le Président – Directeur général de la *Fondation Royale Universitaire Charles I*, connue à Paris aussi sous le nom de *l'Institut Universitaire Roumain Charles I,* créée à Paris en 1951 à l'initiative du Roi Michel de Roumanie.

Il est présent aussi dans les débats longs et difficiles concernant l'organisation politique de l'exil, notamment la structure, la composition et le rôle du *Comité National Roumain*. En tant que membre de l'association d'entraide des Roumains réfugiés *Caritatea Romaneasca – CAROMAN* il se dévoue à l'assistance des réfugiés. Mais ces aspects de la vie de Petre Sergescu dépassent le cadre de cette communication et nous n'allons pas les développer.

Rappelons seulement que son épouse, Marya Kasterska et lui-même, dans leur modeste appartement du Quartier Latin, au 7, rue Daubenton, animent un salon culturel où se retrouvent les samedis soir des personnalités parisiennes de la vie culturelle et scientifique, telles Henry de Montherlant, les mathématiciens Paul Montel et Emile Borel, les historiens des sciences René Taton et Maurice Daumas, à côté des réfugiés des pays de l'Europe de l'Est, notamment de Roumanie, tels Mircea Eliade ou Nicolae Herescu et de jeunes étudiants. Mais on rencontre également de nombreux polonais et des personnalités de passage à Paris venant des quatre coins du monde.

Photo 13 Immeuble 7, rue Daubenton, Quartier Latin, Paris 5ème avec la plaque commémorative

Dans cet appartement Mme Marya Kasterska fonda après le décès de Pierre Sergescu, en 1961, la *Bibliothèque Roumaine*. En décembre 1969, immédiatement après le décès de Mme Kasterska, le juriste Petre Mircea Carjeu, son légataire testamentaire

et celui qui a fait le plus pour la mémoire du couple Sergescu, désignera cette dernière sous le nom de *Bibliothèque Roumaine Pierre Sergesco – Marya Kasterska* (Photo 14). En 1978 il pose une plaque commémorative sur l'immeuble de la rue Daubenton (plaque que vous voyez sur la photo).

Par la suite il transfère cette bibliothèque, dont il était le directeur, au 39 rue Lhomond et la complète avec un

Photo 14. Intérieur de la Bibliothèque Roumaine Pierre Sergesco – Marya Kasterska – Archives Alexandre Herlea

petit musée. Ici se trouvaient, en dehors des livres et des archives provenant des époux Sergescu, ceux des personnalités roumaines telles Elena Văcarescu, Nicolae Iorga, Nicolae Herescu et celles de Marcel Fontaine, directeur de l'Institut Français de Bucarest et de Léon Thévenin, correspondent du journal *Le Temps* en Roumanie.

Plus tard, une partie (les livres de Sergescu et les archives concernant l'*AIHS* et *l'UIHS*) sera donnée, par M. Carjeu, à *l'Académie des Sciences*, une autre partie (les livres de Mme Kasterska) à la *Bibliothèque Polonaise de Paris*. Les fonds documentaires se trouvent aujourd'hui à la *Bibliothèque de documentation internationale contemporaine – BDIC* de *l'Université de Nanterre*. Malheureusement ils ne sont pas encore répertoriés.

Petre Sergescu est décédé le 21 décembre 1954, quatre jours après avoir fêté son 61ème anniversaire, en pleine force de travail (la 13ème photo avec son épouse & René Taton, son plus proche ami); René Taton a eu avec lui un entretien qu'il caractérise «*confiant et détendu*» quelques heures seulement avant sa mort dans lequel Petre Sergescu lui «*exposait ses projets et comme toujours, s'intéressait beaucoup plus à l'avenir de l'Union Internationale et au développement des études d'histoire des sciences qu'à sa situation personnelle*».

C'est une perte durement ressentie par tous ceux qui l'ont connu. Il est enterré au cimetière de Montmorency et sur sa tombe est écrit: «*J'ai ce que j'ai donné*».

Pour conclure, je cite trois de ses admirateurs: les professeurs Paul Montel, René Taton et Maurice Daumas.

Photo 15 Petre Sergescu a son 61ème anniversaire avec son épouse et René Taton

Paul Montel achève son discours aux funérailles de Pierre Sergescu par ces paroles: «*La Roumanie perd un de ses savants et historiens universellement appréciés, la France un de ses amis les plus fidèles et les plus généreux*» (Montel 1955, p.7).

René Taton dans un article publié dans les *Archives Internationales d'Histoire des Sciences* écrit: «*La disparition de cet homme simple, amical et dévoué, de cet historien probe et modeste, de cet animateur hors pair, fut profondément ressentie aussi bien parmi les émigrés roumains qu'il avait aidés avec un extrême dévouement, parmi les nombreux disciples et amis qu'il avait su réunir et parmi toute la communauté internationale des historiens des sciences qu'il avait contribué à reconstruire et animer avec toute son énergie, sa patience et son désir profond d'éviter tout risque d'affrontement politique ou idéologique dans les relations scientifiques internationales*» (Taton 1987, p. 112).

Maurice Daumas en me recevant au *Conservatoire National des Arts et Métiers*, en 1972 et sachant que je suis d'origine roumaine, me parla de Pierre Sergescu et entre autres il m'a dit: «*vous savez nous les historiens des sciences et des techniques français nous sommes tous des disciples de Pierre Sergesco*» (Herlea 2018–2019, p. 25).

Quel bel hommage!

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ACADEMICIAN VIRGIL CÂNDEA
ERUDITE SCHOLAR AND PASSIONATE PHILOSOPHER

*"Fundamentally, I like Romania whatever it looks like,
even in rags I like Romania because it is the world
where I was born, where I was formed, where I assesed myself"*

Virgil Cândea

IOANA VALENTINA POPESCU [*]

Abstract: In 2023, officially decreed by law as the Cultural Year of Dimitrie Cantemir and Ciprian Porumbescu, Romanian culture pays homage to the 350th anniversary of the birth of the scholar Cantemir, whose memory was proudly promoted and preserved by Virgil Cândea, erudite scholar, passionate philosopher, academician, and teacher of generations of Romanian theologians. An iconic figure of Romanian culture, Dimitrie Cantemir broke cultural boundaries, being placed on a high seat in universal culture and supported scientifically, with the admiration, pride, knowledge, and elegance distinctive to Virgil Cândea. All his intellectual qualities led to the international appreciation of Dimitrie Cantemir, whose ample culture and creative thinking made his name synonymous with European humanism. Virgil Cândea captured the finest shades of colour in the philosophical and spiritual portrait of Dimitrie Cantemir and the image of a scholar of Romanian history is easily gleaned from the dozens of studies and articles that he wrote. The patience with which Virgil Cândea deciphered Cantemir's thinking and reasoning was appreciated not only by Romanian historians, but his research was praised internationally by specialists of European historiography. The scholarly personality of Dimitrie Cantemir definitively marked career as a philosopher and historian of ideas, Virgil Cândea representing in the most enlightening way the memorial of the great Romanian scholar.

Keywords: humanism; culture; philosopher; Cantemir; scholar; manuscript; collection.

An accomplished humanist with a vocation as a cultural historian, academician Virgil Cândea worshiped books, but especially his books, and the scholar's erudition was translated into countless studies and researches. Destiny led him to the library and to books, which were close to him all his life as intimate and valuable friends. His library has gained well-deserved fame, thanks to the precious volumes he had collected over the years, and those who had the good fortune to touch and browse through them interacted with Virgil Cândea's unique spirit. His concern for the study of history, philosophy, religion and culture became a way of life, and his research was based on hundreds of thousands of pages read and written by the esteemed Virgil Cândea. His vocation to bring to light events clouded by the passing of the years, to discover evidence and aspects of Romanian culture present beyond the

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country's borders, remains a lesson for all those who think of the Romanian spirit as a supreme virtue. Without the series of volumes *Romanian Testimonies Abroad*, the history of Romania would be poorer, unaware of the thousands of proofs of Romanian spirituality and culture spread all over the world.

Romanian Humanism was studied with keen interest by Virgil Cândea, being deepened by insightful research carried out with great rigour. A great part of his research activity was devoted to the study of the cultural-humanist dimension transposed by Dimitrie Cantemir, through hundreds of works bequeathed to universal culture. An investigator of Romanian history, culture and spirituality, Virgil Cândea followed in the footsteps of his predecesors, illustrious historians of Romanians everywhere, completing the work they had began centuries ago. With the hardships of their era, Alexandru Odobescu, Bogdan Petriceicu-Hasdeu, Ioan Bianu, Nicolae Iorga and others managed to identify numerous documents scattered around the world. The research work undertaken by them was taken over and masterfully enriched by Virgil Cândea, guided by passion, aided by new communication and dissemination systems, specific to the 20th and 21st centuries.

Virgil Cândea is known for the passion and dedication with which he brought back to the forefront of Romanian history the most educated and noble Moldavian ruler, Dimitrie Cantemir, a brilliant scholar depicted in the historical chronicles of his time. Attentive to all that had been written about the young ruler of Moldavia, an exponent of 18th century European culture and Romanian humanism, Virgil Cândea captured the finest shades of colour in the philosophical and spiritual portrait of Dimitrie Cantemir. The interest in knowing as accurately as possible the noble Moldavian scholar, with his wide-ranging scientific abilities, consecrated Virgil Cândea as the one who promoted Cantemir's image, spirit and science, making him a symbol of erudition, unique in the era and geopolitical space he lived in. The image of a scholar of Romanian history is easily gleaned from the dozens of studies and articles that Virgil Cândea wrote when he was painstakingly preparing his doctoral thesis.

The desire to know the man Dimitrie Cantemir led Virgil Cândea into the realm of history and philosophy, and his doctoral research topic went far beyond the imposed boundaries, discovering the unique thinking of Cantemir, promoter of cultural policy in Moldavia. The education the young ruler had received was often invoked in Virgil Cândea's writings, where admiration recorded in his published studies is evident, during the period in which in-depth research into the personality of Dimitrie Cantemir took him many hours. Thanks to this passionate and tireless historical investigation, the researchers of the 20th and 21st century have known in detail the cultural dimension of Cantemir, which has been outlined with the historical accuracy of the scholar Virgil Cândea. The author's research founded his own observation by which historians "of today and tomorrow will always evoke with gratitude and pride these ancient writings, for their imperishable function as witnesses of the cultural past, of literary or scientific exchanges between the peoples of the world" (Cândea, 1964).

The patience with which Virgil Cândea deciphered Cantemir's thinking and reasoning was appreciated not only by Romanian historians, but his research was

praised internationally by specialists of European historiography. Consideration for the work Virgil Cândea done and his "effort to make sure that the transliteration of the Romanian version (originally printed in Cyrillic alphabet) is both accurate and consistent [...] as well as his inclusion of a modern Romanian translation of the Greek version, so as to help the unaccustomed reader with Cantemir's ornate Baroque style" (Impey, 1969). were spotted and praised by foreign scholars. Virgil Cândea's in-depth studies on the importance of Cantemir's historical and cultural contribution to universal culture, began around 1960 and were completed when he was awarded a Doctorate in Philosophy, following the presentation of his work *Philosophy of Dimitrie Cantemir* in 1970.

An iconic figure of Romanian culture, Dimitrie Cantemir broke cultural boundaries, being placed on a high seat in universal culture and supported scientifically, with the admiration, pride, knowledge and elegance distinctive to Virgil Cândea. He had the conviction that the work of the Moldovan prince "the knowledge of our ancient culture will generate admiration and passion, the desire to deepen [...] and stimulate curiosity for the Romanian past among young people who want to dedicate themselves to research" (Deșliu, 2002).

Dimitrie Cantemir is the brilliant figure of a multilateral scholar, who combined his passion for historiography, ethnography, mathematics, music, medicine, philosophy, logic, ethics, geography and cartography with the impetus of men of culture of Western Renaissance. Cantemir, along with the Romanian scholars – Grigore Ureche, Miron Costin, Dosoftei Mitropolitul, Nicolae Milescu, Constantin Cantacuzino, Antim Ivireanu – was a polyglot, with unquechin thirst for knowledge, a discoverer of universal culture and a great lover of travels to lands overseas. All his intellectual qualities led to the international appreciation of Dimitrie Cantemir, whose ample culture and creative thinking made his name synonymous with European humanism.

The dispersal of a large number of manuscripts that belonged to Dimitrie Cantemir is evidence of the cultural value that marks each of his works. A tireless researcher of Romanian testimonies, Virgil Cândea has described, with the precision of a bibliographer, all the works that were written or reproduced after Dimitrie Cantemir's manuscripts. Thanks to Virgil Cândea's relentless desire to record Romanian proofs across the country's borders, it was possible to identify and locate a large number of works that belonged to Dimitrie Cantemir. In the preface to his monumental work *Romanian Testimonies across the Borders*, Vol. I: *Albania-Ethiopia*, Virgil Cândea has partially reconstructed the atmosphere in which a large part of Dimitrie Cantemir's fortune in Turkey was lost in 1710, including "not only palaces, but also manuscripts, books and numerous pieces of art [...]". Two manuscripts reached the West through his son, Antiochus Cantemir: *History of the Rise and Fall of the Ottoman Empire* [U.S.A.]; *Description of Moldavia* [manuscript disappeared] (Cândea, 2010). About the first manuscript Virgil Cândea provided more information explaining the retrival of this Cantemirian document in the catalogue of the library Exquissitissima Thomasiana, Lugduni Batavorum, belonging to Count Friedrich Thomas, indicating page 119, item 816, sold at auction on 18 Oct. 1749 (Cândea, 2010). After a long period when nothing was known about

the buyer of *Rise and Fall of the Ottoman Empire* manuscript, information only came to light in 1901, when Harward University – Massachusetts [USA] bought this manuscript from German antiquarian Otto Harrasowitz (Cantemir and Cândea, 1999).

The Divan, in Arabic translation *Ṣalāḥ al-ḥakīm wa-fasād al-'ālam al-damīm* [*Mântuirea înțeleptului și pierzania urâtei lumi*], which is preserved in the collections of Lebanese and Syrian libraries, is a work that belongs to Dimitrie Cantemir, who was the author of the Arab text recognised established by Virgil Cândea in 1970, following following his journeys in Liban. The veracity of this testimony is unquestionable, knowing Virgil Cândea's passion and accuracy for bibliographical information, this work being published in a bilingual edition, Arabic and English, published by the Romanian Academy, by Ioana Feodorov, daughter of academician Virgil Cândea. The author of this work, entitled The Arabic Version of Dimitrie Cantemir's *Divan*, published in 2006, was awarded the "Mihail Kogălniceanu" Prize of the Romanian Academy for text editing in 2008.

Another Arabic translation of the *Divan* was also recorded by Virgil Cândea in the second volume of *Romanian Testimonies Abroad*: *Finland-Greece*, indicating the French National Library in whose collection is "*Ṣalāḥ al-ḥakīm wa-fasād al-'ālam al-damīm [Salvation of the Wise and the Perdition of the Ugly World], Divan*, Iași, 1698, translation in Arabic by Athanasios Dabbās, ante 1705" (Cândea, 2011). The same Arabic translation is also found in manuscript form in the collection of the American University Library in Beirut (Cândea, 2011) as well as in the collections of the Melkite Greek Catholic Monastery of St. John the Baptist at Dūr El-Šuweyr – Mount Lebanon (Cândea, 2011) and the Catholic Monastery of St. Mary of Šarfeh (Cândea, 2011). Seven other copies in Arabic, also by Athanasios Dabbās, can be found in Syria in the collections of some monasteries. An Arabic copy of the *Divan* was also discovered in the collection of the Apostolic Library of Vatican and is recorded in vol. VI.1 of *Romanian Testimonies Abroad*: Ukraine-Vatican (Cândea, 2016).

The Divan [text "in Romanian and Greek" (Cândea, 1964)] written by Dimitrie Cantemir, the volume published in Iasi in 1698, is also found in the collection of the Dionysius Monastery on Mount Athos, this book belonging temporarily to "Antim Ivireanul and Mitrofan, hegumen of the Cotroceni monastery in Bucharest" (Cândea, 2011).

Virgil Cândea is also the historian who documented the existence of "the definitive manuscript of the Ottoman Empire, the one that served for the translation and publication of Cantemirian works in the West, discovered at the Houghton Library (Harvard University in Cambridge Massatchusetts)" (Cândea, 2010). The French and English translations of this work written by Dimitrie Cantemir, *History of the Rise and Fall of the Ottoman Empire*, were discovered in the collection of the National Library of France. Histoire de l'Empire Othoman, où se voyent les causes de son aggrandissement et de sa décadence, translated into four volumes by M. de Joncquières, was published in Paris in 1743, and *History of the Growth and Fall of the Othoman Empire*, translated into two volumes by Nicolas Tindal, was published

between 1734 and 1735 in London, both of which are mentioned by Virgil Cândea in volume II of his remarkable work *Romanian Testimonies Abroad*: Finland-Greece (Cândea, 2011)*.* Another volume of this English translation is also in the collection of the Vatican Apostolic Library (Cândea, 2016), together with the French translation (Cândea, 2016).

Only by carefully studying all the volumes of this monumental work on *Romanian Cultural Evidence Abroad,* do we discover unknown titles, documents or Romanian art objects that had been forgotten. A thorough research of Volume I of the work *Romanian Testimonies Abroad* from Albania-Ethiopia revealed the existence of some copies French translation *Histoire de l'Empire Othoman, où se voyent les causes de son aggrandissement et de sa décadence*, published in 1743 in Paris, together with another German translation, after an English edition, *Geschichte des osmanichen Reichs* [...], translated by Johann Lothar Schmidt and published in 1745 in Hamburg, these translations are in the collection of the Austrian National Library (Cândea, 2010). The latter German translation can be also seen in the collection of the Eötvös Loránd University Library in Budapest (Cândea, 2018).

We also mention here the homage to Dimitrie Cantemir in the framework of the *Great UNESCO Anniversaries* of 1973, on which occasion Virgil Cândea wrote a brief presentation, published in several languages: *Dimitrie Cantemir: 1673–1723, 300 years since his birth*. The year 2023. officially decreed by law as the *Cultural Year of Dimitrie Cantemir and Ciprian Porumbescu*, Romanian culture pays homage to the 350th anniversary of the birth of the scholar Cantemir, whose memory was proudly promoted and preserved by Virgil Cândea, erudite scholar, passionate philosopher, academician and teacher of generations of Romanian theologians. The Romanian Academy together with the Romanian Academy Library have joined the Romanian cultural institutions since the beginning of 2023, thus paying tribute to the outstanding personality of Dimitrie Cantemir.

Born on April 29, 1927, in Focșani, Virgil Cândea was an intellectual proud of his roots in the paths of Moldavia, a place from which great personalities of Romania descent, naming here Nicolae Iorga, Mihai Eminescu, Mihail Kogălniceanu, the list being infinitely longer and more valuable. But, "although born in the heart of Moldavia, a significant part of my roots, my paternal branch, is deeply rooted in the soil of Transylvania" (Cândea, 2003). The distinguished academician made an analysis of the origin of the name *Cândea* about which he said "Cândea is an old name from this part of the country, a name then spread to other Romanian regions, where it also appears in toponymic form – for example, Cândești in the Subcarpathian areas. Families with this name has also lived in the country of Hațeg – since the 13th century, old Hungarian documents mention some Cândea kniazes in Banat, Maramureș and, of course, Moldova" (Cândea, 2003).

The son of an officer of the administration, Virgil Cândea arrived in the capital when his father was transferred to a military unit in Bucharest in 1933. Five years later, the eldest son of the Cândea family was enrolled at the renowned St. Sava High School, known today as St. Sava National College (Deșliu, 2002). During high school Virgil Cândea was a generation colleague with people who distinguished themselves,

becoming personalities in fields such as history, diplomacy or literature: Dinu G. Giurescu, Dionisie Gherman, Ion Dumitru-Snagov and many others. The teachers who took them through the universe of sciences were, among others, Șerban Cioculescu and Eugen Ionescu.

About his seven years at high school, Virgil Cândea used to talk with excitement and pride, recalling the uniform of St. Sava High School, which he describes in an interview with *Saeculum Magazine*. Also, during his high school studies, the distinguished academician was to make his debut in the world of writing, signing articles in the issues of the *Literary Review of St. Sava High School*, from 1944 to 1945 (Ivanici, 1994). The library of this famous high school was for Virgil Cândea the place where the future philosopher, theologian, historian and academician Virgil Cândea discovered valuable books, its collection having been carefully built up since the foundation of *St. Sava Academy* by Stolnic Constantin Cantacuzino. This collection was organized by Constantin Brâncoveanu, who, for several years, oversaw the smooth running of the Princely Academy. Most of the books that belonged to the library of St. Sava High School are now in the collection of the Romanian Academy Library, being easily identifiable by the stamp, some of them also bearing the autograph of the Stolnic/High Stewart Cantacuzino (Pop, 1933). His high school library was not only a place of study for him, but remained as a model for the organization of books by topic, later using it to build up his own library.

Since 1945, Virgil Cândea became a student at the University of Bucharest, Faculty of Law, where he had his bachelor work in 1949. At the same time, he also attended the Faculty of Philosophy, where he got admission in 1946 and graduated with a state exam in 1950. At this faculty, Virgil Cândea was a student of Professor Henri H. Stahl, who was teaching Sociology (Deșliu, 2002). During the same year, 1950, he also enrolled at the Faculty of Philology, *Department of Classical Studies*. Virgil Cândea also attended Theology courses, explaining that "the dissatisfaction with which I finished my studies in philosophy (one of the faculties most seriously affected by the educational reform of 1948) led me to attend the University Institute of Orthodox Theology (1951–1955), the former Faculty of Theology excluded from the State University with the reform mentioned above, and I can say that of all the high schools I attended, this one shaped my research activity and intellectual orientation the most strongly" (Deșliu, 2002). His four years of theological studies were held while he was already employed at the Romanian Academy Library, where he found and studied the valuable books that existed and still exist in the collections of this cultural institution. All these years of study were essential in the formation of the erudite historian, tireless researcher, Academician Virgil Cândea, a model for generations of young graduates. Many years after graduation, with his experience as a former student and professor, Virgil Cândea said (in a television programme conducted by Iosif Sava) "this is truly the property that no one takes away from you and the most legitimate property possible, that of learning" (Cândea, 1993).

With great consideration, in an interview in 2002, Virgil Cândea recalled the teachers of his student days, naming Tudor Vianu – professor of Aesthetics; Dumitru Stăniloaie – professor of Moral Theology, etc., whose books can be found in his vast

library, an important part of it being donated to the reading cabinet that bears his name, within the *Manuscripts Department* of the Romanian Academy Library. Moreover, Virgil Cândea had the opportunity to work with Tudor Vianu on the first two volumes of Alexandru Odobescu's *Works,* being the author of the annotated commentaries. During the time of writing this work, 1958–1960, Tudor Vianu was the director of the Romanian Academy Library and Virgil Cândea an employee of this institution.

After graduating in Philosophy, in 1951 he was assigned to the central newspaper *România Liberă*, but he refused (Cândea, 1993), his destiny leading him to the Romanian Academy Library, which he defined as "an ocean of books, manuscripts, old documents" (Rusu-Păsărin, 1993), this institution "a treasure of Romanian and universal culture preserved in books, magazines, manuscripts, documents and rare collections of priceless value" (Deşliu, 2002), contributing decisively to his intellectual and professional development.

His first position in the Romanian Academy Library was that of bibliographer, which suited him perfectly. Here he had the chance to learn the secrets of library services from recognized specialists in the field, such as Gabriel Ştrempel, researcher of Romanian manuscripts and old books, Viorel Cosma, researcher of the history of music, George Băiculescu, bibliographer, he learned decimal classification from Ion Ion Lupu, and the cataloguing of books by Traian Popovici. After a while he was transferred to the new documentation department of the library, more precisely to the *Scientific Documentation Department* (title given in 1957), of which he was head until 1961. This department had an important activity in that period of rethinking the management of the collections of the Romanian Academy Library, so that, in a short time, many works considered as tools in the scientific research work were drawn up[1] (1867–1967).

His professional career continued with a brief experience as head of the Documentation Department of *Carpaţi National Tourist Office*, a position he held for several months in 1962. In the same year he was appointed head of the Library of the *Dr. I. Cantacuzino Institute*, a position he held until 1965 (Ivanici, 1994). At the same time, Virgil Cândea was increasingly involved in passionate activities that preoccupied him over the years. During all this time, his doctoral thesis on Dimitrie Cantemir was beginning to take shape, he wrote it marked by the admiration of the historian who researched passionately and with dedication.

His historical research was not interrupted during all the years mentioned above, on the contrary, it gained consistency and scientific value, and Virgil Cândea's path led him to the *Institute of Southeast European Studies* where he was senior scientific researcher from 1968 to 1972, he also held the position of director. Between 1978 and 1990, the future academician was secretary general of the *Romania Cultural Association*. He also held the position of secretary of the *Romanian National Committee for South East European Studies* (Ivanici, 1994), and from 1965 he became director of the *General Secretariat of the International Association of South*

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[1] *Biblioteca Academiei Republicii Socialiste România: Cartea centenarului: (1867–1967).* Bucureşti: Editura Academiei, 1968, p. 88.

East European Studies, as well as editor of the journal issued by the association, the *Bulletin of the International Association of South East European Studies,* from 1963 to 1968 and from 1988 to 1994 (Barbu, 2009). From 1963 Virgil Cândea became director of the *General Secretariat of the International Association of South Eeast European Studies* until 1994, when he was appointed honorary president.

In an article in the review *Magazin Istoric*, Ioana Feodorov, the distinguished daughter of the academician said: "Virgil Cândea saw possible, within the *International Association of South-East European Studies (IASEES)*, the opening towards the Eastern Mediterranean countries, lands outside Europe, but so much linked, spiritually and not only, to South-East Europe. In his contributions to the meetings of the association, Virgil Cândea often referred to the interest of Romanian intellectuals in the Arab expression of the Byzantine heritage, to the joint projects of Romanian and Syrian hierarchs and to the role of Romanian voivodes in supporting the Eastern Patriarchates" (Feodorov, 2014).

In 1963, Virgil Cândea began his teaching career as a lecturer at the Faculty of Law, where he taught until 1966 the postgraduate courses *History of International Relations* and *History of Culture and Religious Art*, and at the Faculty of Theology of the University of Bucharest he taught classes between 1963 and 1965 and later, starting in 1993, he resumed his collaboration with this faculty, teaching a course on *Christian Art*, for students in the third and fourth years of study. His teaching was also appreciated abroad, where he became known for his historical studies and research published in specialty papers. Invitations to teach at various foreign educational institutions soon followed, and in 1965 he became a visiting professor at the *Oriental University Institute in Naples* (Filiti and Feodorov, 2015), and in 1967 a visiting professor at the *University Institute of International High Studies* and the *University Institute of European Studies* in Geneva, where he taught classes of *History of International Relations* until 1971. He was also a visiting professor in 1982, when he was invited to teach at the *Lebanese University* of Beirut, and in 1983 at the *University of Strasbourg*. Between 1980 and 1982, Virgil Cândea was a professor at *Nicolae Grigorescu Institute of Fine Arts*. Year 1990 brought Virgil Cîndea in Rome as a visiting professor at "*La Sapienza*" *University* in Rome (Anghel and Deșliu, 2000).

About Professor Virgil Cândea, his former students tell, with great admiration and appreciation for what the renowned academician bestowed in class. Such a description of what Virgil Cândea shared to those who were his students may arouse the envy of those who did not have the honour of being in the auditorium, because: "Christian art courses were distinguished by something unique. The richness and abundance of information, the documentation and the multitude of horizons opened in those classes that I wanted to never end were coupled with a simplicity of statement, a sign that things he was saying came after long understanding and meditation and they had become familiar to the teacher. Topics such as the vision of the cosmos and the Church of Saint Maxim the Confessor, the great iconographic cycles in ecclesiastical art, up to the monuments and styles of ecclesiastical art in the Romanian Principalities,

or the images of enlightened voivodes and scholars, always filled the lecture hall not only with students at theology, but also with an external audience attracted by the quality of his lectures" (Scorţea, 2014). It should be remembered that Virgil Cândea was a doctoral supervisor until the last year of his life.

Over the years, Virgil Cândea was active as a member of several Romanian and international bodies, starting with 1971, when he became a member of the *Union of Writers*. In 1978 he was elected vice-president of the *Italian-Romanian Centre for Historical Studies* in Milan. In 1983 he became a member of the *European Cultural Centre* in Geneva, and in 1984 he was appointed research scientist of the *Wilson Center* in Washington. He was also awarded member of the Association of American Historians (Anghel and Deşliu, 2000). In 1990, Virgil Cândea was elected member of three European bodies, namely corresponding member of the *Hellenic Society of Archaeology* in Athens, member of the *Sudosteuropa-Gesellschaft* in Munich and corresponding member of the *Board of Directors of the Euro-Arab University* in Rome. He was also elected "member of the *European Academy of Sciences, Arts and Letters* in Paris" (Berindei, 2007). Also in 1990, he was elected a member in Romanian bodies, namely in the governing boards of the *European Centre of Culture* in Bucharest, as well as in the governing board of the *Association of International Law and International Relations*, and the *Romanian National Commission for UNESCO* (Ivanici, 1994). Also in 1990 he was elected member of the *National Church Assembly* in Bucharest (Dictionary of Romanian Theologians).

Virgil Cândea the author made his debut in the written culture in his last years of high school, between 1943 and 1944, when, as editor of the *Literary Magazine of St. Sava High School*, he published poems and reviews. A decade later, he was to collaborate with Mircea Maliţa, at that time director of the Romanian Academy Library, and together they founded the *Journal of Bibliological Studies and Research.* For the first three issues of the magazine Virgil Cândea was editor and author, for the other issues he only signed the preface. Subsequently, Virgil Cândea began publishing, under the pseudonym F. Gheorghe, works in which were evoked "Pious Paul Everghetinos (11th century) and Pious Nicodemus Aghiorite (18th century)" (Andreescu, 2000), the first work being found in the contents of the magazine *Mitropolia Olteniei*, in 1956. Together with other later works these studies were the determining factor that ranked Virgil Cândea among the leading Byzantinologists, being "considered «original contributions» to the knowledge of the old Romanian translations of the *Apophetgmata patrum*" (General Dictionary of Romanian Literature). Virgil Cândea himself recounted that, "not being able to do spiritual history as such, for some years I wrote in our religious magazines" (Rusu-Păsărin, 1993). Still employed at the Romanian Academy Library, in 1960, he collaborated with Aurel Avramescu to draw up Introduction to Scientific Documentation, a 520-page monograph, which was considered "the first treatise on this subject in Romania and the second to appear in the world, after that of Paul Otlet" (Cândea, 2015). (published in 1934). Their book, publishet at the Academy Publishin House quickly became a working tool for researchers,

being a specialist work. "The volume *Introduction to Scientific Documentation* is a generous and valuable document, in which technical and theoretical solutions to address documentary material are presented" (Haiduc, 2014).

During the period he worked at the Romanian Academy Library, Virgil Cândea participated in drawing up some specialized works in the field of librarianship: in 1959 he contributed to the elaboration of the volume *Dialectical Materialism and Contemporary Natural Sciences. Selective Bibliographical Index*, 1945–1960; in 1960 he collaborated in the elaboration of the volumes *Guide to Documentation in Natural Sciences and Applied Sciences*; *Guide to Documentation in Agricultural Sciences*. Numerous specialized articles bear his signature in periodicals like *Călăuza bibliotecarului*; *Revista Bibliotecilor*; *Studii și cercetări de bibliologie*, articles that appeared also after 1961, the year when his professional relationships with the Romanian Academy Library ceased.

Translating old books was, for the scholar Virgil Cândea, a noble occupation, so that in 1960 he published and commented on *Journey across Three Seas*, a book written by Afanasie Nikitin, which he translated from Slavonic, and then, in 1961, he translated into Romanian the work of a Bengali poet and published *Tagore en Roumanie*, translations that formed the basis of his assertion as an orientalist among Romanian historians of the day (Simion, 2004–2009). Around the same time, he began his doctoral research on the scholarly personality of Dimitrie Cantemir, who definitively marked his career as a philosopher and historian of ideas, Virgil Cândea representing in the most enlightening way the memorial of the great Romanian scholar.

Thousands of scientific works were dedicated to the Romanian humanism of the Medieval Age, and many of them bear the valuable signature of Virgil Cândea, who was an accomplished specialist, working with abnegation and tenacious curiosity to discover every detail that would recompose the whole philosophical picture of Dimitrie Cantemir like a puzzle game. Knowing his aptitude for discovering *Romanian Testimonies Abroad...*, Virgil Cândea was the best able to state that: "Authors like Dimitrie Cantemir are considered as belonging to the old Romanian writing, when in fact, he illustrated modern Romanian and universal culture. It is known that translations of Dimitrie Cantemir's work are part of the modern French, English, German and Russian bibliography, while his originals in Romania, printed at the same time or later, are included in the Old Romanian Bibliography" (Cândea, 1980). The monumental work elaborated by Virgil Cândea, who gathered with unparalleled effort an impressive number of glimpses of Romanian culture, is based on a bibliographic conception, punctuation being specific to librarianship field, in which Virgil Cândea made his professional debut. Virgil Cândea approached Cantemir's work with philosophical carefulness that makes him the most pertinent Romanian author who has penetrated the stylistics of Dimitrie Cantemir, the benchmark of 17th century European intellectuals.

The history of the events was presented with a simplified logic that facilitated the understanding of the reader of Cantemiri's work, regardless of his nationality,

these qualities being true gifts that place the late Virgil Cândea in the definition of Romanian intellectual of the 20th century.

On 9 March 1991, Virgil Cândea was assigned corresponding member of the Romanian Academy, and on 13 February 1993 he was nominated member of the Romanian Academy, thus crowning a lifetime research activity on the "history of ideas and cultures" (Anghel and Deșliu, 2000). From 13 February 1998 until 4 March 2002, he held the position of vice-president of the Romanian Academy, joining the ranks of personalities who were leading this institution – the national Forum of Romanian culture.

Virgil Cândea (Source: Personal Archive)

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REVIEWS

CELLULOSE CHEMISTRY AND TECHNOLOGY:
ADVANCES IN THE CHEMISTRY, PHYSICS AND TECHNOLOGY
OF POLYSACCHARIDES AND LIGNIN[1]

VALENTIN I. POPA[*]

In the academic year 1949/1950, the Pulp Department established a year earlier in Bucharest, was transferred to Iași, and the responsibility for coordinating it lays with Academician Cristofor Simionescu, then associate professor. The core of the department was formed by Assoc. Prof. Eng. Vasile Diaconescu (later professor) and Profs-to-be Elena Calistru and Emanuel Poppel. The team was then completed by Dorel Feldman, Grigore Stejar, Elena Corlățeanu and Gheorghe Rozmarin, who along the years brought their contribution to the formation of specialists in the fields of pulp, paper and rayon fibers, and to the development of a number of research directions. From the very start, the teaching staff became actively engaged in a prolific research activity, which was recognised both nationally and internationally.

The research directions approached in the Department of Pulp and Paper were not random or conjectural, as they were consistent with those in similar schools worldwide (Simionescu 1972). As a result, the fields investigated allowed Romanian specialists to obtain original results that contributed to occupying leading positions in the field of pulp, paper and rayon fibers (Popa 2021).

As a result, the first success was recorded in 1961, when the **First International Symposium on Cellulose Chemistry and Technology** was held in Iași, under Prof. Cristofor Simionescu's coordination. The event became a tradition, and 13 editions were further organised under Prof. Cristofor Simionescu's leadership. The 14th edition paid homage to Prof. Simionescu's lifelong scientific activity, celebrating his 90th birth anniversary.

Over the years, the international symposia have enjoyed the participation of renowned experts in the field from around the world. On the occasion of the 2nd Symposium (1965), Z. A. Rogovin, former professor at the Institute of Textiles in Moscow, well-known for his valuable contribution to the field of cellulose chemistry, along with other foreign specialists, proposed to launch a journal entitled *Cellulose Chemistry and Technology*, to be edited in Iași under the auspices of the Romanian Academy, and to entrust Acad. Cristofor Simionescu with this mission. Pointing out the steadfast climate favorable for the progress of research in this area, the great hospitality of the Romanian people, the spiritual youth and the excellent organisation

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of the symposia, in association with a few foreign participants, whose names are still listed on the frontispiece of the journal, even though they have passed away, he addressed Acad. I. G. Murgulescu, asking him to embrace and support this proposal. Further results confirmed that, although it appeared spontaneous, his suggestion was well thought out and had chances of long-term success.

The meetings of the members of an international editorial board would create occasions for more and more specialists, both experienced and younger ones, to come to know each other, build communication bridges and boost creation. The city of Iași was entrusted with a research center, which, at the crossroads of civilisations and responsive to cultural acts, would prove capable of standing up to the scientists' expectations. In September 1968, the first meeting of the editorial board was organized (at that moment, formed by 53 members), which drew together the most brilliant representatives of the cellulose schools from around the world at that time: M. Chêne (France), P. Cremonesi (Italy), K. Dimov (Bulgaria), H. Dolmetsch (Germany), E. Giese (Germany), R. Husemann (Germany), A. I. Kalninsh (USSR), H. Sihtola (Finland), T. E. Timell (USA), V. Diaconescu (Romania). The meeting was held on the occasion of the 3rd International Symposium of Cellulose Chemistry and Technology, organised on September, 18–22, 1968, in Iași. The editor-in-chief Cristofor Simionescu's report highlighted the wide geographical coverage of the journal, ensured by scientific contributions submitted for publication by authors virtually from all over the world: Austria, Bulgaria, Canada, Czechoslovakia, Egypt, France, the split Germany at the time, India, Italy, Japan, Poland, Romania, USA and USSR. The second editorial meeting was held in September 1971, and again enjoyed remarkable international participation: F. Bertran (Cuba), E. Correns (GDR), E. Daruwalla (India), Y. Fahmy (Egypt), A. Frey-Wyssling (Switzerland), E. Garnum (FAO), M. Lewin (Israel), H. P. Naveau (Belgium), Z. A. Rogovin (USSR), I. Sakurada (Japan), J. Schurz (Austria), L. Stockman (Sweden), V. Diaconescu, E. Poppel and D. Feldman (Romania).

The participants emphasized the echo of the *Cellulose Chemistry and Technology* journal abroad and expressed their appreciation of its steady progress, achieved by raising the scientific quality and the degree of originality of the contributions published – the result of a collective effort, of the perseverance and enthusiasm of all those involved in the magazine. In his report, Prof. Simionescu underscored the contribution of the 58 members of the editorial board (from 27 countries), who engaged in reviewing the manuscripts to ensure the publication of high-quality scientific content. In the opening conference of the 4th International Symposium (Iași-Suceava, September 28 – October,2 1971), Prof. Simionescu addressed issues of pressing actuality in the field of cellulose and paper chemistry and technology of the time, which, despite the time elapsed, are still as current and have even turned into priorities. Defying the idea brought out the same year (1971) by *Angewandte Chemie*, which announced that "natural sciences were approaching their endpoint", Prof. Simionescu expressed his belief that, in order to maintain the status of science in progress, cellulose chemistry and technology needed to join

biology, physics and mathematics in an interdisciplinary relation (a very bold idea!). In his view, the so-called crisis in the theoretical chemical sciences emerged from the lack of understanding that in the near future the various branches of the natural sciences would interact and join in the common effort to decipher the secrets of nature.

Thus, considering that the chemistry of cellulose, hemicelluloses, lignin and their derivatives was only a Cinderella of modern chemistry, it would be imperative to intensify research in the field of wood to find solutions to pressing issues:

– the alarming increase in the degree of irrational forest exploitation, as a result of expanding industrialisation and continuous population growth;

– a more efficient use of the wood, possible by deeper research on its biological, physical and chemical structure;

– processing wood in a way that would diminish the quantity of waste and unusable by-products, and thus, would reduce environmental pollution;

– preventing global crisis in the pulp and paper industry, which was going to affect mainly Europe – said Prof. Simionescu in 1971! – by planting new forests, along with using alternative raw materials, provided by, for example, annual plants, gramineae straws, reed, kenaf or fast-growing species, especially willow, poplar and eucalyptus, and other tropical species that can be grown on lands unsuitable for agriculture.

However, all these objectives require not only theoretical studies in plant physiology, anatomy and molecular biology (and other sciences), but also the fast application of the results in practice, developing chemical technologies and biotechnologies for valorising vegetal biomass. In this context, since its founding, the journal has published numerous papers on fundamental and applicative issues regarding renewable and recyclable resources, which make this field the only one that belongs under sustainable development, thus embodying the hope to provide, besides conventional products, bioproducts with the most diverse applications. In this way, the biorefinery concept was coined, which refers to a facility that can lead to increasing the efficiency of the pulp and paper industry, integrating the possibilities to obtain products of chemical and energetic value. Thus, contributions to the biorefinery field have also found a place in the contents of the journal in recent years.

The journal joined an already existing publication in Romania – Pulp and Paper (1951), and allowed the exchange with journals and books published abroad, thus offering Romanian scientists the possibility to keep a permanent contact with similar research centers from around the world, even during the harsh period before 1989.

In its 57 years of existence, the journal has proven its real importance in ensuring the participation of Romanian scientists to the exchange of information, to make their contribution known, as well as in bringing numerous journals and books into the country annually. At present, when we are witnessing a real informational tsunami, the *Cellulose Chemistry and Technology* journal, indexed ISI since 1992, is published in both online and print forms, and successfully continues its activity, hosting papers from all over the world.

According to SCOPUS (https://www.scopus.com/sourceid/25811) the CELLULOSE CHEMISTRY AND TECHNOLOGY journal is a reputed research journal. It is published by **Editura Academiei Române/The Publishing House of the Romanian Academy**. The **impact factor** of CELLULOSE CHEMISTRY AND TECHNOLOGY is **1.387. H index 35**. The journal is indexed in **UGC CARE, Scopus, SCIE**. The **(SJR) SCImago Journal Rank** is **0.302.**

The latest Quartile of CELLULOSE CHEMISTRY AND TECHNOLOGY is **Q3**. Each subject category of journals is divided into four quartiles: Q1, Q2, Q3, Q4. Q1 is occupied by the top 25% of journals in the list; Q2 is occupied by journals in the 25 to 50% group; Q3 is occupied by journals in the 50 to 75% group and Q4 is occupied by journals in the 75 to 100% group.

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