Journal of Young Scientist, Volume IX, 2022
ISSN 2344 - 1283; ISSN CD-ROM 2344 - 1291; ISSN Online 2344 - 1305; ISSN-L 2344 – 1283

GRIGORE MOISIL – LIFE, SCIENTIFIC WORK AND WORDS OF WIT

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Figure 1. Grigore C. Moisil (1906-1973)

Abstract

The mathematician and computer scientist Grigore Moisil, member of the Romanian Academy, was one of the most prominent personalities in the history of Romanian science. Starting this year, January the 10th was declared in Romania the National Day of Mathematics, Informatics and Sciences, in honor of Mosil, this being exactly his birthday. Moisil is the "father" of Romanian computer science. He also distinguished himself by a very broad mathematical horizon, being the author of a vast scientific work. Last but not least, Grigore Moisil was a charismatic person, being the author of some memorable words of wit that remained famous, and he had a permanent dialogue with the press, popularizing mathematics, computer science and science in general. In this article we propose a foray into the life and work of academician Grigore Moisil.

Key words*: computer science, Grigore Moisil, mathematics, scientific work, words of wit*

INTRODUCTION

The mathematician and informatician Grigore Moisil was born on the 10th of January 1906 in Tulcea, Romania. He is considered the founder of Romanian computer science, following the invention of tristable electronic circuits, and due to his contributions in the professional training of the first computer scientists in Romania.

“Together with Simion Stoilow, Miron Nicolescu and Gheorghe Vrănceanu, Gr.C. Moisil was one of the many great professors of mathematics that the University of Bucharest has enjoyed since the fifth decade of the past century; those distinguished teachers who, together with some brilliant predecessors, were to become the great heads of the Romanian school of mathematics.

Gr. C. Moisil formed not one school, but several schools (including one on mechanics, one on mathematical logic, and one on the algebraic theory of automatic mechanisms). This is explained by the fruitfulness of his ideas, by the mastery with which he knew how to present not a "ready-made" mathematics, but one that was built in the presence of the audience and in which open problems, aspects that could be improved were always emphasized. His thinking was essentially open, according to the remark he made so strongly somewhere: <<No problem has borders. Every answer has many>>”. (Marcus S., 1975). Starting this year, in honor of Moisil, January the 10th, the date of his birthday, was declared in Romania the National Day of Mathematics, Informatics and Sciences.

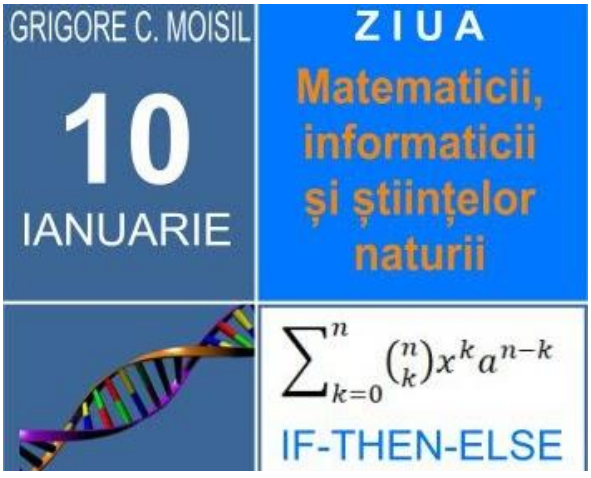

Figure 2. January the 10th, the date of his birthday, was declared in Romania the National Day of Mathematics, Informatics and Sciences.

HE "INVENTED" THE SIMPLE RULE OF THREE

Grigore Moisil's upbringing, "Grigri," (Greygrey) as his mother caressed him, and as he remained all his life for relatives and friends, has been bizarre since the early years. Twisted, he learns, for example, to count and only later to read. "A long, long time ago I was very young. I didn't know my mother had been very young. She didn't start with teaching me to read or write, but to count. She wanted to make me stop being afraid of math. After she taught me to count from 1 to 10, she jumped. (…) The simple rule of three she knew how to make me invent it. Then the mental calculation began ", Grigore Moisil said in an interview in the “Woman" magazine, in 1954.

STUDIES

He attended primary school in Bucharest, and high school in Vaslui (“Mihail Kogălniceanu” Theoretical High School) and Bucharest (“Spiru Haret” High School) between 1916-1922.

In 1923 he entered the Faculty of Mathematics at the University of Bucharest. His parents considered that a person with his mathematical skills must necessarily become an engineer. In 1924 he began his studies at the University POLITEHNICA of Bucharest, at the construction department, although a stronger call was maintained by the Faculty of Mathematics, where his teachers were Dimitrie Pompeiu, his mentor, Gheorghe Țițeica, Traian Lalescu, Anton Davidoglu. Thus Grigore C. Moisil was at the same time a student of the Polytechnic and the University of Bucharest. The interest in mathematics became a priority, so in 1929 he left the Polytechnic, although he had already passed all the exams in the first three years. But in the same year he defended his doctoral thesis in mathematics, “Analytical mechanics of continuous systems”, in front of a commission led by Gheorghe Țițeica. This thesis was also published in 1929 by Gauthier-Villars in Paris.

In 1930 he left for Paris, where he studied at Sorbonne with great mathematicians. In 1931 he took the teaching exam, with the work “Sur une classe de systèmes d'équations aux dérivées partielles de la Physique mathématique. Afterwards, he went to Rome with a Rockefeller scholarship, and studied between 1931 and 1932 with the mathematician Vito Volterra.

UNIVERSITY CAREER

In 1932 he returned to the country, where he became a full professor at the University of Iasi in 1932, then an Associate Professor in 1935, and a University Professor in 1939. He taught the first modern algebra course in Romania, "Logic and Demonstration Theory", at the University of Iasi. In parallel, he began a series of works on the logics of the Polish mathematician Jan Łukasiewicz. His research in logic was the basis of a strong school of mathematics in the country and abroad (Argentina, Yugoslavia, Czechoslovakia, Hungary). During the Iasi period he also published works in the fields of mechanics, mathematical analysis, geometry, algebra and mathematical logic. He extended in n dimensions Pompeiu's areolar derivative and studied the monogenic functions of a hypercomplex variable with applications to mechanics, he introduced trivalent and polyvalent algebras called Łukasiewicz (now called Łukasiewicz-Moisil algebras) and used them in and in the study and the logic of switching circuits. He developed new methods of analysis and synthesis of finite automata and had valuable contributions in the field of algebraic theory of automated mechanisms.

In 1941, a university professor position became available at the University of Bucharest. Four remarkable Romanian mathematicians entered the competition: Gheorghe Vrănceanu, Dan Barbilian, Miron Nicolescu and Grigore Moisil. Although only Vrănceanu, the oldest of them, was initially selected, Moisil convinced the Minister of Education that it had a rare opportunity to develop mathematical research in Romania. Consequently, the Ministry of Education created four teaching positions at the University of Bucharest, and hired all four. Moisil received his position in the academic year 1941-1942.

In the years 1940-1950 he published intensively in the field of electronic circuits.

Between 1946-1948 he was appointed Ambassador of Romania to Ankara. While stationed in Turkey, he gave a series of mathematics lectures at Istanbul University and Istanbul Technical University. In 1948, he returned to the University of Bucharest.

In the 1950's he became passionate about computer science. At the time, the official philosophy dictionary, translated from Russian and published in 1953, described the field of cybernetics as "a reactionary bourgeois science directed against the working class."

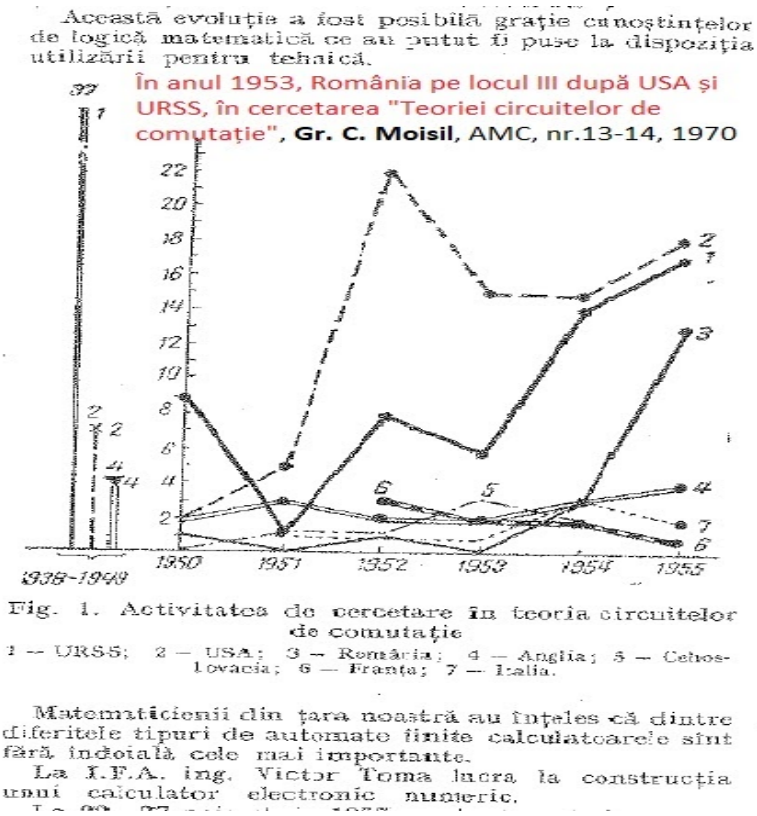

Figure 3. World research activity in the theory of commutation circuits in 1953

THE ACTIVITY OF THE COMPUTING CENTER OF THE UNIVERSITY OF BUCHAREST

In Annexes I and II of the article "Activity of the Computer Center of the University of Bucharest", one can see the diversity of courses and institutions on the activity of using electronic computers. For example, the courses took place at the headquarters of the following institutions, in the period 1963-1969, when Gr. C. Moisil was director of CCUB: Computing Center of the University of Bucharest (CCUB), Institute of Mathematics of the Romanian Academy, Energy Institute of Romanian Academy, Astronomical Observatory of the Romanian Academy, Institute of Fluid Mechanics of the Romanian Academy, Aerodynamic Research Center, Ministry of Petroleum and Chemistry, Ministry of Machine Building, Ministry of Railways, Ministry of Armed Forces, Military Academy of Bucharest, Bucharest, Polytechnic Institute, Bucharest Construction Institute, Faculty of Mathematics of Iași, Institute of Design, ISPE, IPROMET, ISCAS, CEPECA, IPACH, CSCAS.

In 1953, Romania was ranked third after the USA and the USSR, in the field of research on "Theory of switching circuits", regarding the number of published scientific articles. From the chart below, it can be seen that between 1938 and 1949, the USSR had 37 articles, the USA had 8 articles, and England had 4 published articles. "This evolution was possible thanks to the knowledge of mathematical logic that could be made available for use in technology" Gr. C. Moisil.

SCIENTIFIC ACTIVITY

- He published scientific papers in the fields of mathematical analysis, algebra, mathematical logic, geometry, mechanics;
- Particularly valuable are the contributions made by Grigore Moisil in the field of algebraic theory of automatic mechanisms. He developed new methods for the analysis and synthesis of finite automata, as well as a structural theory of them.
- He extended in the space with several dimensions the areolar derivative of D. Pompeiu. Areolar velocity in physics is a vector quantity that represents the area swept in the unit of time by the vector radius of a moving material point on a

curvilinear trajectory. The definition formula is given by the expression:

$$\vec{\Omega} = \frac{d\vec{A}}{dt}$$

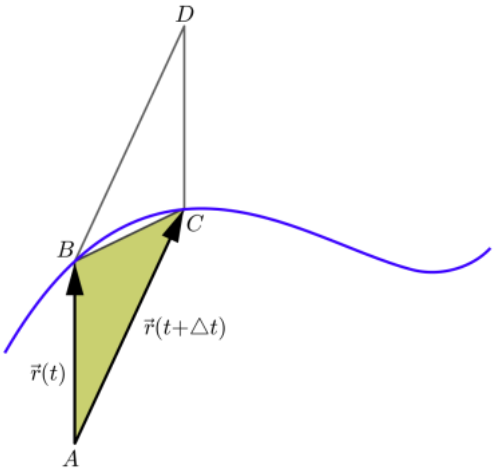

Figure 4. The areolar derivative

- •He studied the monogenic functions of a hypercomplex variable, with applications to mechanics. A complex function $f: A \subset \mathbb{C} \to \mathbb{C}$ is called monogenic at a point $\zeta \in A$ if there exists and it is finite the derivative

$$f'(\zeta) = \lim_{z \to \zeta} \frac{f(z) - f(\zeta)}{z - \zeta}$$

- •He introduced algebras called trivial and polyvalent lukasiewiczien and used them in logic and in the study of commutation circuits. Moisil has made a significant contribution to the introduction and use of the first electronic computing machines in our country.
- •He wrote many scientific articles and 17 books, of which we mention: "La mecanique analytique des systemes continuus" (1929), "Logique modale" (1942), "Introducere in algebra" (1954), "Teoria algebrica a mecanismelor automate" (1959), "Circuite cu transistori" (2 volumes, 1961- 1962).

PROMOTING MATHEMATICS AND THE USE OF COMPUTERS. SCIENTIFIC, DIDACTIC CONCERNS AND INITIATIVES OF GRIGORE C. MOISIL

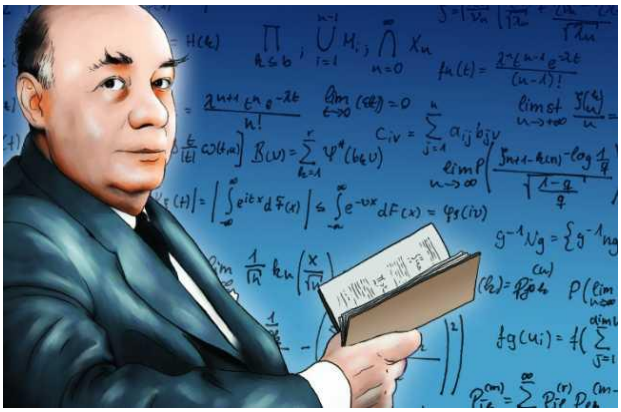

Figure 5. Grigore C. Moisil

In 1962, Grigore C. Moisil founded the Center for Computing of the University (CCUB), where he was honorary director until 1969, the "gray eminence", as he amused himself. The first machine used was the digital one by Victor I. Toma "CIFA 1", replaced in 1968 by an IBM /360 computer. Here he learned the programming languages and the underlying disciplines, abstract algebra, mathematical logic, Boolean algebras, the first educational team to teach computer science today at the Faculty of Mathematics in Bucharest, or at other educational centers: Prof. Constantin P. Popovici, Sergiu Rudeanu, Leon Livovschi, etc. . As a result of the growing interest of non-mathematicians in mathematics, Grigore Moisil began in 1970 a series of lessons in Mathematics for the Humanities at the semiotics laboratory of the Faculty of Philology in Bucharest.

In 1971 he left the position of Algebraic Theory of Automatic Mechanisms, which he had held since 1967 at the Faculty of Mathematics and became a professor at the Faculty of Philosophy and Law. At the age of 65, he began a series of completely new and original courses in Fundamentals of Mathematics, Sentence Logic, Operational Research. He is the one who introduced computer science education at the Faculty of Mathematics in Bucharest.

Secondary education has not been left out of its sphere of interest either. As president of the Romanian Mathematical Society, he was in contact with high school teachers. In 1965 he proposed the establishment of special mathematics classes, in 1968 he held an experimental course in mathematical logic at the

"Petru Groza" High School in Bucharest; also in 1968 he opened the first postgraduate courses in computer science.
In 1970 Gr. Moisil opened the column "Science and Humanism" in the magazine "Contemporanul", which he continued until his death.

A HUMOROUS MATHEMATICIAN

Grigore Moisil, however, was not the kind of mathematician to delve into his studies. Instead, he enjoyed teaching math to those around him.
In principle, mathematics is not a branch of science that is appreciated by many pupils or students. It is difficult, it requires strength of concentration and long study, but Moisil managed to make his students learn with pleasure. How did this work? Because he had a lot of humor and used this quality to relax his students during class.
Among his famous jokes are those about women, such as: "Every man needs a mistress! The wife thinks he is with his mistress, the mistress thinks he is with his wife and so he can sit quietly in the library to read. " Ironically, an adaptation of this joke to modern times would probably require the man to play on the computer.
However, he also joked about the lack of intelligence of some of his peers: "The laws of the country do not forbid anyone to be an idiot."

GRIGORE MOISIL'S PASSION FOR LITERATURE AND WRITING IS LESS WELL KNOWN

From his literary essays we selected the lyrics:

„Pe vârfuri de zăpadă, când soarele apune,
Ca pietre nestemate sunt boabele de gheată.
Lucesc şi-a lor sclipire ne pare o minune.
Bătrânul munte râde de-astă frumoasă fată."

("On snowy peaks, when the sun goes down,
Ice grains are like precious stones.
They shine and their sparkle seems like a miracle,
The old mountain laughs at this beautiful girl.")

PASSING AWAY TO ETERNITY

He died in Ottawa, Canada, on the evening of May the 21st , 1973. Inevitably, the news spread out to all continents: reaching out to colleagues in Japan, teachers in Paris, and family at home.
Despite the sudden death, family and friends were barely talking about this moment.
"Whenever he didn't feel well, he did math, and also whenever he was happy he did math. It's rigour matched his logical spirit. <<What are you passionate about outside of your profession?>> an editor once asked. He answered: Mathematics" (Mosil V., 2002). This is another declaration of love for mathematics. Because, no matter how obsessive mathematics may seem in a teacher's life, practiced "when you brush your teeth and when you don't brush your teeth", this was his great joy.

MORE WORDS OF WIT (THE SO CALLED "MOISILISMS")

For more interesting aspects see Moisil V., 1989 and Moisil V., 1998.
•"*Explozivul cel mai puternic nu este toluenul, nici bomba atomica, ci ideea omeneasca.*"
("The most powerful explosive is not the toluene or the atomic bomb, but the human idea.")

•"*Spre deosebire de vin, stiinta nu trebuie lasata sa se invecheasca.*"
("Unlike wine, science must not be allowed to age.")

•Explicand principiul recursivitatii:
"*-Esti de acord ca orice om are dreptul la un pahar de vin?*
-Da.
-Bei paharul, ıl pui jos. Esti alt om. Si cum orice om are dreptul la un pahar de vin … si asa mai departe."
(Explaining the principle of recursion:
"-Do you agree that everyone has the right to a glass of wine?
- Yes.
- Drink the glass, put it down. You are a different man. And how everyone has the right to a glass of wine … and so on.")
•

$$1^1 = 1,\ 1^2 = 1, 1^3 = 1 \ldots$$
$$2^1 = 1,\ 2^2 = 2, 2^3 = 8 \ldots$$
$$0^1 = 0,\ 0^2 = 0, 0^3 = 0 \ldots$$

Concluzii: "*unde-i unul, nu-I putere; unde-s doi, puterea creşte; o nulitate ridicată la putere tot*

nulitate rămâne" (ultima cu referire la regimul Ceaușescu).
(Conclusions: "where there is one, there is no power; where there are two, the power increases; a nullity raised to power remains a nullity" (the last one referring to Ceausescu's regime)).

•"*Căsătoria este singura scăpare pentru un bărbat fără succes și pentru o femeie cu prea multe*."
("Marriage is the only escape for a man without success and for a woman with too many.")

•"*Dușmanii sunt recrutați dintre prieteni."*
("Enemies are recruited among friends.")

• "*Problema morții este vie (la o anumită vârstă)."*
("The problem of death is alive (at a certain age).")

• "*Nu este greu să ai dreptate; e greu sa-i convingi pe altii*."
("It's not hard to be right; it's hard to convince others.")

• *Se știe că o idee începe cu un paradox, continuă cu o banalitate și ajunge să fie o prejudecată*.
(It is known that an idea begins with a paradox, continues with a banality and ends up being a prejudice)

• "*Ce este un pesimist? Un optimist bine informat."*
(What is a pessimist? A well-informed optimist.)

• "*Nu e de părerea ta cel care te aprobă, ci acela care te imită.*"
("It is not of your opinion the one who approves you, but the one who imitates you.")

• *Desigur, nu tot ceea ce iese din comun are o valoare, dar tot ceea ce are o valoare reală este – în mod necesar – ieșit din comun*.
(• Of course, not everything out of the ordinary has a value, but everything of real value is - necessarily - out of the ordinary.)

• În ședința Consiliului Profesoral pentru titularizare, prof. Ștefan Procopiu a votat împotriva numirii lui Moisil, „candidatul fiind prea tânăr pentru a ocupa funcția de profesor".
„*Este un defect pe care îl corectez în fiecare zi*", a răspuns Moisil.
(At the meeting of the Teachers' Council for the tenure, Prof. Stefan Procopiu voted against the appointment of Moisil, "the candidate being too young to hold the position of professor": "It's a defect that I correct every day," Moisil replied.)

• "*— Matematica asta pe care o predici, m-am săturat de ea.*
Moisil: Dar matematica se face de sus!"
("This math you're preaching, I'm tired of it.
Moisil: But math is done from the top up!")

• "*— Domnule profesor, credeți în vise?*
- Sigur, dragă! Vedeți, cu ceva timp în urmă am visat că am devenit academician, că sunt la clasă și că prezidez o ședință. Și când m-am trezit, eram într-adevăr un academician, eram în clasă și conduceam o ședință."
("Professor, do you believe in dreams?"
- Sure, darling! You see, some time ago I dreamed that I had become an academician, that I was in the classroom, and that I was chairing a meeting. And when I woke up, I was really an academician, I was in the classroom and I was chairing a meeting.)

• La o întâlnire în care factorii politici au discutat despre unificarea diferitelor departamente, profesorul Moisil a vorbit cu vocea sa inconfundabilă:
"- *Este o idee bună. Ca urmare, propun ca geometria să se unească cu geografia și geologia și îl propun pe Geo Barton ca preşedinte*." (Notă: un actor cunoscut la acea vreme.)
(At a meeting in which political factors discussed the unification of various departments, Professor Moisil spoke in his unmistakable voice:
"- It's a good idea. As a result, I propose that geometry unite with geography and geology, and I propose Geo Barton as president." (Note: a well-known actor at the time.)

• "*E bine să cunoşti bine pe cineva. Dacă îl cunoşti foarte bine, e rău".*
("It's good to know someone well. If you know him very well, it's bad.")

• „*Sunt oameni care spun: există şi greşeli fecunde. Nu greşeala e fecundă, ci îndreptarea ei."*
("There are people who say: there exist also fruitful mistakes. It is not the mistake that is fruitful, but its correction.")

• "*Iarna sunt tradiționalist fiindcă port căciula, vara sunt paradoxal fiindcă umblu cu capul gol, primăvara sunt socialist din cauza naturii, toamna sunt burghez din cauza umbrelei."*
("In winter I am a traditionalist because I wear a hat, in summer I am a paradoxical because I walk bareheaded, in spring I am a socialist because of nature, in autumn I am a bourgeois because of my umbrella.")

• "*Aproape toate meseriile pe care cineva le va practica în viitor, de la inginerie la muzicologie, de la fizică atomică la turism, de la istorie la medicină, vor folosi calculatoarele. Calculatoarele nu merg singure, ca să meargă trebuie să aibă oameni pricepuţi să le mâie. Ca să ai oameni pricepuţi, trebuie să îi înveţi: CE?"*
("Almost all the jobs that someone will practice in the future, from engineering to musicology, from atomic physics to tourism, from history to medicine, will use computers. Computers do not work on their own, in order to work, they need skilful people who can handle them. In order to have skilful people, you have to teach them: WHAT?")

• "*Omul trebuie să înveţe logica nu pentru a învăţa să judece corect, ci pentru a învăţa mai repede să judece corect."*
("Man must learn logic not to learn to judge right, but to learn to judge right quicker'')

• *"Matematica va fi limba latina a viitorului, obligatorie pentru toti oamenii de stiinta, tocmai pentru ca matematica permite accelerarea maxima a circulatiei ideilor stiintifice.*"
("Mathematics will be the Latin language of the future, mandatory for all scientists, precisely because mathematics allows the maximum acceleration of the circulation of scientific ideas.")

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