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Grigore C. Moisil: A Life Becoming a Myth

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"All what is correct thinking is
either mathematics or feasible to be
transposed in a mathematical model."
Grigore C. Moisil
(1906 - 1973)

Grigore C. Mosil, Romanian mathematician, Professor at the University of Bucharest - Faculty of Mathematics and Computer Science, member of the Romanian Academy, member of the Academy of Sciences in Bologna and of the International Institute of Philosophy, Computer Pioneer Award of IEEE Computer Society (IEEE - 1996).

Grigore C. Moisil belongs to the fifth generation of Romanian mathematicians. The first generation includes the founders Spiru Haret and David Emmanuel, both with doctorates at Sorbonne (Paris). They were born at the middle of the XIXth century and have the merit to initiate the high level mathematical research in Romania. (We leave aside Transylvania, with Janos Bolyai, who already in the first half of the XIXth century discovered non-Euclidean geometry). The second generation includes the first Romanian mathematicians with a long career of scientific research: Gh. Ţiţeica, D. Pompeiu (both with doctorates at Sorbonne), Al. Myller and Vera Myller (both with doctorates at Gottingen, Germany). They had already an important impact on Moisil's formation as a mathematician.

The third generation includes Victor Valcovici, Traian Lalescu and Simion Stoilow (considered as the most important Romanian mathematician until the sixties of the XXth century), born in the eighties of the XIXth century. Lalescu died very young (in 1929), but Valcovici and Stoilow became great professors not only before, but also after the second world war. We have then a fourth generation of mathematicians born in the last decade of the XIXth century: Octav Onicescu (the initiator of the Romanian school of Probability theory), Petre Sergescu (the organizer of the first two congresses of Romanian mathematicians, before the second world war), Dan Barbilian (the same as the poet Ion Barbu), Alexandru Froda and Gheorghe Vranceanu (the greatest Romanian geometer after Ţiţeica).

Directly or indirectly, all these mathematicians had an impact on Moisil's personality. Born in Tulcea (Dobrogea), with a long genealogic tree of high intellectuals in the North-Western part(Bistriţa-Năsăud) of Romania, with school training partly in Bucharest, partly in Iasi (Moldova), Moisil's childhood and adolescence are well known from his own diary published in the recent years by Moisil's widow Viorica Moisil, who took great care of the whole scientific and human heritage of her husband.

The main teachers of the child Moisil were his parents; his father was an important historian, while his mother was just an educator for elementary school. The child Grigore enjoyed to look around, to give free expression to his curiosity and wonder, to ask questions, to read books of a large diversity, from science to literature and from practical jobs to philosophy. He felt always the need to react to what he was seeing, listening and reading. His diary is an excellent mirror of this fact. His main pleasure was always of an intellectual nature, he was not attracted to play with other children or to practice various sport games. His mother taught him to count and to make calculations and only in a second step to read and to write. The most important part of the learning process took place at his home, with his parents and some time with his brothers and his sister, all of them becoming

intellectuals. Moisil's diary should be known by the children of the new generations.

The attitude of the child Moisil towards learning remained his attitude towards life. He enjoyed to interact with people, to read, to write and to learn. He did all these things with pleasure and with humor, he was able to contaminate people with his capacity to discover something new where most people see nothing new; to invent questions where most people believe that everything was already answered. His attraction for mathematics did not diminish his interest for the other school disciplines. His curiosity was total and remained total during his whole life. But his passion for mathematics and his way to understand mathematics lead him to see the world through the glasses of mathematics; so mathematics was not for him only a profession, a job, it was a way to look at the life and at the universe.

When Moisil had to become a university student, choosing math was equivalent for most people with choosing engineering, so his parents pressed him to choose Polytechnical School, where he became a student in 1924; but one year before he became also a student of the Faculty of Science, Mathematical Section. He did not like engineering, so he never finished Polytechnical School, but the irony of life decided that Moisil had to return to engineering much later, when he discovered that logic and engineering share some very important features. On the other hand, the university student Moisil attended many classes of philosophy, of history and of art. His teachers were Ţiţeica, Lalescu, Davidoglu and others, but the university teacher who impressed him the most and became his spiritual model was Dimitrie Pompeiu. His PhD thesis (1929) was about the analytic mechanics of continuous systems.

As a characteristic feature of his works published in the twenties and the thirties of the past century, we observe that most of them were at the interference of differential equations (with partial derivatives), differential geometry, function theory and mechanics. The main reason of this situation was that Moisil was devoted to the topics most considered by his predecessors and his colleagues (Pompeiu, with his areolar derivative, Vrânceanu, with his neolonomic varieties, Nicolae Teodorescu with his papers on Finsler spaces etc.), but he also paid attention to the work of some great Western mathematicians of his time: Eli Cartan, W. Blaschke, and mainly Vito Volterra and Jacques Hadamard. Having the opportunity to work with Volterra (1931-1932) in Rome, Moisil became a pioneer of the functional methods in differential geometry and mechanics (let us recall that Volterra is one of the initiators of Functional Analysis). But before this, Moisil was in Paris, working with great French mathematicians such as Hadamard (1930-1931); he spent a second period in Paris after returninf from Rome. So, in this atmosphere Moisil obtained a generalization of Volterra's conjugate functions and he also generalized Hadamard's total geodesic varieties. From the same period let us recall the joint paper by Moisil and Teodorescu on holomorphic functions in the space (1931), the first joint work in Romanian mathematics. Joint works remained a rare phenomenon until the middle of the past century.

At November 1, 1932, Moisil is named a provisional associate professor of Algebra at the University of Iasi. At that moment, Moisil was already the author of an important number of scientific papers, but no of them was in the field of Algebra. His first algebraic paper (in the field of non-associative algebra) was published only in 1934. So, this fact came as a surprise. But for a good observer, nothing surprising was in this fact. Behind the diversity of topics, Moisil was, in most of his mathematical papers, mainly an algebraist, his genuine thinking was almost always of an algebraic nature. In everything he did, he projected an algebraic spirit. Within the framework of his traditional preoccupations of analysis, geometry and mechanics (monogeneity, function theory, geodesics in some Riemann spaces, partial differential equations etc.), he works with algebraic tools such as functional groups, parametric groups, monogenic quaternions, hypercomplex numbers, ideals of polynomials, areolar polynomials, polynomials associated to some bilinear differential expressions with constant coefficients, interpretation of the fundamental group of a differential variety etc.

To the above fact, we have to add an event having an important role in Moisil's life: the publication, in the first part of the fourth decade of the past century, of the book of Van der Waerden, "Moderne Algebra". It was an important sign of the move of algebra from the quantitative to the qualitative, from the algorithmic to the structural phase of its evolution. It was a turning moment in Moisil's mathematical life, an event having a huge impact on Moisil's further evolution. In this order of ideas, we should observe that Moisil is the first to introduce Bourbaki's ideas in Romania, at a moment when Bourbaki's mathematical structuralism, strongly influenced by the German school of structural algebra, was only a project. In his course of general analysis (Analiza Genarala) published towards the end of the thirties of the past century, Moisil gives an account of Henri Cartan's theory of filters, while uniform spaces were also presented there. But Moisil was not the first to teach in Iaşi modern structural algebra; he was preceded in this respect by Vera Myller. On the other hand, Emmanuel and Lalescu had also, at some moments, the opportunity to teach some ideas on groups and fields. However, it seems that Moisil was the first to give to this structural style the whole amplitude. Only Barbilian will go further in this respect, but this will happen

in the second half of the fourties of the past century.

Moisil became full associate professor of Algebra at January 1, 1935, but at November 1, 1936 he got a position of Professor of Differential and Integral Calculus and then full Professor of Calculus in November 1939, all of them at Iaşi University.

Moisil spent ten years at Iaşi University (1931-1941). It was a period in which he alternated his old interests in continuous mathematics, with applications to mechanics and physics, with his new interests in discrete mathematics, mainly in algebra and logic. Moisil was very impressed by an article due to the Polish logician Jan Lukasiewicz, on the logic with three values (then the interest moved to several values) and by the analogy proposed by Lukasiewicz between the non-classical logics, on the one hand, and the non-Euclidean geometries, on the other hand. As the initiator of the logic of three values, Lukasiewicz was considered as the Lobatchevski of logic. It was one more reason for Moisil to be attracted by logic: his philosophical interests lead him to pay great attention to the philosophical consequences of quantum mechanics, where Aristotle logic is no longer valid. Indeed, the principle of excluded middle is here replced by a principle of included middle. In the thirties of the past century, important authors, such as John von Neumann, paid attention to the logic of quantum mechanics. It was also the principle of universal determinism which was under question; certainty is replaced sometimes by probability. Moisil and some of his colleagues (Onicescu, Procopiu, Barbilian etc.) organized some debates on this topic and reading his writings in this respect one can understand how this interest motivated him to orient his attention towards mathematical logic, a field where he published his first paper in 1936, in a volume devoted to the 75th birthday of Vitto Volterra. He will never leave this field, but concomitantly he will remain also stable in his old interests. Only in the last decade of his life he will be devoted exclusively to discrete mathematics. But, being first of all an algebraist, Moisil will project in his studies in logic the same algebraic spirit. His main project was to build for Lukasiewicz's logic of several values an algebraic framework in a way similar to the way George Boole has proposed in the XIXth century an algebraic model for Aristotle's logic (based on the principles of identity, non-contradiction and excluded middle). Moisil called this framework "Lukasiewicz algebras", but ultimately these algebras received the more appropriate name "Lukasiewicz-Moisil algebras"; this name became the title of a monograph published at North Holland Publishing House by a team lead by Professor Sergiu Rudeanu.

His move from Iaşi to Bucharest University, at the end of the year 1941. was a dramatic one. Not only Moisil, but also Vrânceanu, Barbilian and Miron Nicolescu were competing for the same position of professor. Among them, Moisil was the youngest and with the smallest chance to win. The winner was Vrânceanu. Then, Moisil had the happy idea to convince the ministry of education, Ion Petrovici, to create three different chairs and so all of them became professors; it was the great chance for the next generation (that of the author of these lines) to benefit of such great professors.

After the second world war, Moisil had many interesting initiatives. One of them was related to an idea proposed by Shannon in his PhD thesis and independently by some Russian engineers, to associate electric circuits with binary logic, because each of them works with two values: yes or no in logic, while the circuit is open or closed. Moisil succeeded to develop this idea in many variants, stimulating a whole team of researchers to articulate engineering, classical and non-classical logics and various types of algebraic structures with some ideas from number theory. Another fruitful idea was to associate some matrices to some systems of linear partial differential equations.

But perhaps more important was the way Moisil understood, in the early fifties, that the emergence of the new paradigm of information, communication and computation could change to a large extent the social, cultural and scientific life of the next decades. In 1949, he initiates a whole school in the field of the algebraic theory of automatic mechanisms As a professor of the Bucharest University, he was the first to teach there mathematical logic. Articulating logic and automata, Moisil was well prepared to organize the Romanian development in the emergent field of Computer Science. He monitorized the building of he first Romanian computer, by Victor Toma, at the Institute of Atomic Physics, in 1957, and, on the other hand, he organized courses in the field of computation at the Faculty of Mathematics, University of Bucharest. He also directed the first promotion of students in Mathematics to work with the team of Victor Toma, at the Institute of Atomic Physics; they were trained to learn programming at the new computers CIFA (Calculatorul Institutului de Fizica Atomica). The first Romanian team of mathematicians included Dragos Vaida, I..Moldovanu, Gh. Zamfirescu, G. Klarsfeld. So, we can say that 1957 is the date of birth of Romanian Computer Science, under the guidance of Professor Moisil and by the collaboration between engineers and mathematicians.

In 1962, Moisil initiates a new section "Computing Machines" at the Faculty of Mathematics and Physics of the Univ of Bucharest and, associated with this section, the Computing Center of the Univ of Bucharest (CCUB); as a matter of fact, CCUB was under the guidance of the Chair of Algebra, whose chief was Moisil. In 1963,

CCUB is endowed with the computer CIFA 3, the third version of the first Romanian electronic computer, and with an analogic computer of MEDA type. Moisil is very active in preparing the corresponding mathematical background: learning of ALGOL 60, organization of a seminar of algebraic theory of automatic mechanisms (started in 1954), organization of a course of logic applied to electric circuits and of a seminar of mathematical logic (started in 1966); numerical analysis and combinatorics are also stimulated. In a further step, mathematical biology and mathematical linguistics as well as perspectives of computation in various fields of the humanities: history, archeology, musical composition etc. In 1968, CCUB is endowed with a computer IBM 360/30 of the third generation and the learning of FORTRAN and COBOL is introduced. CCUB became a place where people from all cultural horizons came to learn from Professor Moisil how could they take profit in using in their own field the mathematical and computational thinking. Lawyers and musicians (among them, Aurel Stroe), engineers and economists, linguists and philosophers, biologists and medical doctors, painters and writers were visiting CCUB and the main reason of this fact was the presence there of Professor Moisil, who had the gift to leave the mathematical jargon and to address non-mathematicians in the simplest possible language; and in this simple language he was able to explain the mathematical and computational way of thinking.

The capacity of Moisil to seduce and to fascinate the auditory became very fast an element of attraction for mass media. Newspapers, radio and television began to invite him and Moisil became a star whose fame was in competition with that of the most popular singers and actors. His unique voice, his way to transform the speech in a song, his spontaneity, his humor, his permanent state of joy made Moisil so popular, that even today, 33 years after his death in May 1973, his statements are still in the attention of the public. "New ideas appear first as paradoxes, then they become common truth and ultimately they die as prejudices"; "Is logic a practical science ? Yes, because you learn from it how to take decisions" ; "You lose a lot of time when you believe that you know what in fact you don't know". Many of his jokes have a mathematical structure. Here is a joke illustrating the recursive thinking: "Every man has right to a glass of wine; but when you drink a glass of wine, you become another man" (the corollary: every man has right to infinitely many glasses of wine). A joke illustrating self-reference: a child asked him: "Professor Moisil, do you like dreams ?" – "Yes, I had once a dream in which I was sleeping during a session and when I waked up I was really in a session". Jokes having the same pattern, being so able to be produced algorithmically: "The water is bad, even in the shoes"; "everything can be proved; even the truth"; "you can fall in love with any women; even with your wife"; "every joke can make you to be in the best mood; even the above ones". All these jokes have as a common denominator the confusion between normality and exceptionality: the water in the shoes, the proof of a truth; to be in love with your wife. As soon as you understood the pattern, you can produce infinitely many jokes of similar type.

At 11 february 1971, Moisil sends a letter to the Rector of the Bucharest University, proposing a whole program of organization of education in the field of computers and their mathematics. In January 1973, he sends another letter to the dean of the Faculty of Mathematics, where he explains that this Faculty has a great responsibility concerning the formation of the teachers of computer science with a solid mathematical background. Moisil explains that the main job in this respect is to assure the computational literacy of the coming generations, because in the emergent period of the information and computation all professions will need in some way familiarity with computing and programming. Very few people were aware at that moment of this truth which today is obvious. In this respect, we can consider Moisil as a kind of Spiru Haret of the second half of the past century: Haret was an important fighter against illiteracy, while Moisil was an important fighter against computational illiteracy.

Due to his multiple interests, Moisil succeeded to form a lot of disciples in various directions: in mechanics of solids (Nicolae Cristescu, P.P.Teodorescu, M. Predeleanu, George Dinca), in logic (Sergiu Rudeanu, George Georgescu, Afrodita Iorgulescu), in computer science (Dragoş Vaida, Constantin Popovici, Paul Constantinescu), in logic of electric circuits (L. Livovschi), in algebra, in analysis, in differential geometry.

If the child Moisil revealed a total curiosity, the same totality characterizes the creative work of the adult Moisil. Within mathematics, he interrelates all its domains; beyond mathematics, he is looking for the way mathematics may have an impact on natural and social sciences; beyond science, he is questioning the relation between math and philosophy, between math and art; beyond culture, he is interested in the impact of math in the everyday life.

Scholars are of two types: the ant type, looking for what happens in a specific area of knowledge and trying to deepen more and more the respective segment of investigation; but there is also the bee type, going from flower to flower and changing frequently the area of investigation. Obviously, Moisil was of the second type.

But, looking with more attention at his behavior, we realize that he was sometimes of a mixed type, because he liked to go back to flowers already visited. I remember his renewed interest in the sixties in the problem of mechanics he discussed long time ago in his PhD thesis. After the second world war, his growing interest in discrete mathematics was concomitant with the continuation of his work in continuous mathematics. His general

strategy was to trust the unity of mathematics and the potential solidarity between its different parts, including the case when these parts seem to be completely away each other. For this reason, he used to oblige his PhD students to pass examinations on some chapters of math which apparently were very far from the object of direct interest of the respective student. This is the reason why most of his papers combine different branches of math.

Another interesting feature of Moisil's works is their strong link with the works of his colleagues and of his professors. A typical example are his papers of geometry. Arrived in Iaşi at the end of the year 1931, when he was only 26, but with his thesis published by Gauthier-Villars (Paris, 1929), Moisil found an adequate atmosphere in the Seminar lead by Al. Myller, predominantly concerning differential geometry. At that moment, he was considered, in view of his already published works, the founder of the theory of infinite dimensional Riemann spaces. To this, he added the study of infinite Lie groups and of mechanical systems with infinitely many degrees of freedom. But the geometric methods used by Moisil were for him a tool to investigate the mechanics of systems of material points with infinitely many degrees of freedom. For him, the respective geometric model consists of infinite dimensional subvarieties in an adequate Hilbert space. In other situations, he is oriented towards the geometrization of systems of equations with partial derivatives. So, analysis, geometry, mechanics form an organic mathematical entity. See, for more, in this respect, the article by Acad. Radu Miron in "Academica" (forthcoming, 2006), from which we have borrowed some elements.

In order to illustrate the style of work done by Moisil in the field of math and humanities, we will indicate some ideas he developed in the field of what he called "the mechanical grammar of Romanian". He proposed some new classifications of Romanian nouns and verbs. Two ideas deserve to be mentioned. The first one concerns the possibility to use, in the declension of nouns and conjugation of verbs, of what he calls the method of variable letters, by means of which he copes, in a very elegant way, with the phenomenon called in linguistics "morphological alternances". The variable letters are like the functions defined by means of two or several analytic expressions, each of them for a specific part of the domain of definition of the function. Another idea proposed by Moisil concerns the conjugation of verbs, where a classification is made according to the behavior of what is called "the more than the perfect" (mai mult ca perfectul). Another paper concerns a comparative analysis between the linguistic conjunction "and" and the mathematical conjunction "and", in the case of Romanian language, but things remain valid, to a large extent, for other languages too. For instance, it is shown the contrast between the possibility to iterate indefinitely the use of "and" in logic, and the impossibility of doing the same in linguistics.

To his own works in this respect, Moisil added his capcity to stimulate and to guide the first steps in the development of mathematical and of computational linguistics in Romania. He guided the first algorithm of automatic translation (English-Romanian) by Erica Nistor, the similar work by Minerva Bocsa in Timisoara, the work done by the team lead by P. Schveiger in Cluj-Napoca and the work done by Eliza Roman in the field of automatic abstracts and automatic documentation. The author of this lines remains indebted to Moisil for his major help jointly with the linguist Alexandru Rosetti, concerning the first steps of mathematical and computational linguistics in Romania. Moisil and Rosetti made possible the organization of the first university courses with this profile; they founded "Cahiers de Linguistique Theorique et Appliquee", a journal of an interdisciplinary nature, devoted to the interferences among linguistics, mathematics, computer science and poetics.

The remarkable fact, in these articles, is the capacity of Moisil to develop the mathematical way of thinking in absence of the usual mathematical jargon, consisting of formulas, equations, calculations etc. He never leaves in these texts the natural language.

Another aspect of Moisil's personality can be seen in his philosophical writings. Mathematics and philosophy were for him two faces of the same coin, each of them requiring the other. Already during his childhood and adolescence, his interrogative nature and his readings prepared the way towards his philosophical personality. He reads Poincare and selects in his diary statements such as : "Science deserves to be studied for the glory of human spirit" and "for the enormous pleasure offered by the knowledge of truth", more than "for its practical utility". Somewhere he notes: "Life is a work of art. It is a pleasure to think to what happened sometimes in the past and will never happen again !". In another place he notes: "Pleasure is more attractive when you are looking for it than when you feel it". A lot of remarks related to his readings in the field of history, of literature, of natural sciences, of religion etc. All of them, when he was 7, 8, 9, 10, 11, 12, 13, 14. Here is a comment about the cause of wars: "If we cancel the fights having no rational motivation, only a few of wars remain in the memory of the history". A word of wisdom: "You don't have to exagerate in love, because you risk to end by exagerating in hate".

The articles in the field of philosophy deserve a special attention. The first one, chronologically, was published in 1937 and concerns the successive steps in the development of the mathematical knowledge. Moisil was at that time under the strong influence of the ideas of Vito Volterra, who pays attention to the way mathematical knowledge is born from the pre-mathematical knowledge. In a first step, qualitative descriptions are converted

in quantitative ones, by means of measurements and counting. Then the mathematics of quantity are developed, until the moment when qualitative aspects are again in attention. The development of physics and of mathematical analysis are followed concomitantly. The mechanical stage, the energy stage and the Einsteinian stage of the generalized relativity theory are analyzed. Then he directs his attention towards the development of qualitative mathematics and the main example is here the notion of a group, observed on the particular cases of the group of rotations and the group of permutations. We are lead in this way to what Moisil will call structural mathematics and the way is prepared to connect it to the general emergence of structuralism (in psychology, in linguistics, in anthropology and before them in chemistry, with the idea of isomerism). Moisil will be among the first to observe the big change brought by the new fields of topology, functional analysis, combinatorics, graph theory, mathematical logic, abstract algebra. In the same way, Moisil stresses the importance of the theory of complex numbers and of their structural aspects. Moisil analyzes the way classical infinitesimal calculus lead to general topology. The idea of a differential is both quantitative and structural (having the structure of a polynomial). Logistics is a clear example of reduction of quantity to structure and this is the task of Russell's and Whitehead's "Principia Mathematica". Starting from the contrast observed by other authors between the quantitative aspect of mathematics and the qualitative aspect of the acts of thinking, Moisil observes that the acts of thinking have a structural rather than a qualitative aspect and so the mathematician's job is to investigate the algebraic structure of the acts of thinking. So, concludes Moisil, "ce n'est pas a l'ancienne logique de la qualite qu'on devra s'adresser, mais a la nouvelle algebre de la structure. Ce n'est pas en effet trop tot si on essaie de construire une theorie coherente de la vie spirituelle".

In his "La logique formelle et son probleme actuel" (1939), Moisil investigates the principles of classical logic (identity, contradiction, excluded middle) and their modifications in Brouwer-Heyting's intuitionistic logic, in Kolmogorov's intuitionistic logic, in Lukasiewicz's ternary logic; he also discusses the very nature of axiomatic deductive systems, with special attention to Hilbert, Russell and Poincare. This investigation is continued in "Sur l'autonomie des mathematiques" (1941), where he is using the term "panmathematisme" understood as the process of approaching mathematically the natural sciences and those of the human spirit (sciences de l'esprit)". In this order of ideas, he characterizes the mathematical activity as being irreducible, i.e., independent of empirical investigations and of any previous rational development. This is for him the autonomy of mathematics. Moisil meets, in this respect, the way old Greeks (Pythagoras, Platon), then Kant and Goethe, conceived mathematics (for Kant, mathematics is what is called in German Geisteswissenschaft). The utilitarian function of mathematics is in most cases a consequence of its cognitive function, but the temporal distance between the cognitive moment and the utilitarian one is usually imprevisible. We stress this fact, because in his writings after 1950, in view of the ideological constraints, he will no longer state explicitly the autonomy of mathematics, but he will defend strongly the need to develop pure mathematics, mathematics for its own sake, as a condition to reach applied mathematics. Moisil considers that the human spirit can reach the center of a deductive discipline; mathematics can bridge the self and the non-self. He is consistent with the idea emergent much later, according to which the subject-object distinction will no longer be considered as sharp as in the classical science; consequently, the distinction between natural and human sciences is under question. As a matter of fact, mathematics is for Moisil by excellence a human discipline.

The last philosophical article he published before the communist regime was his "Closure lecture at the University of Iaşi" (16 January 1942): "The perspectives of axiomatic philosophy". We learn from this lecture that Romanian scientists paid a great attention to the philosophical problems of their science, mainly those related to non-Euclidean geometries and to relativity and to quantum mechanics. Philosophers like Ion Petrovici, physicists like St. Procopiu, mathematicians like Victor Valcovici, Simion Stoilow, Octav Onicescu, Dan Barbilian and Gr. C. Moisil were involved in hot discussions on these topics. Ultimately, Moisil stresses the human side of mathematics. "The axiomatic freedom of mathematics does not fit with something similar in the real life" observes Moisil and this premonitory statement is followed by other similar statements: "Human creative work is by excellence one of expression. The deep human desire is to be understood by other peoples. This expression which succeeds to be communicated is just what we call culture". Will this communication remain possible ? Such thoughts expressed in the hot year 1942, when the war knew dramatic changes and the future became increasingly unsure are just the thoughts of Moisil at the moment when his stage in Iasi ends and a new university life will begin in Bucharest.

At some moment, Moisil makes reference to "Goedel paradox". Clearly, he has in view the famous 1931 Goedel incompleteness theorem, but it is clear that this theorem had to wait until it will be understood in its deep meaning and huge consequences for the whole mathematics. This was not only Moisil's shortcoming, but a shortcoming of the quasi totality of the mathematical community. During the summer of the year 1942, Stoilow and Barbilian had a daily correspondence about foundations of mathematics, but the reference to Goedel 1931 theorem did not exist

in their dialogue.

Sometimes, Moisil is very near to some ideas emergent much later. For instance, in "Determinism si inlantuire" (1940), he refers to Georges Bouligand in connection with the fact that small changes in the initial data may have a big impact on the further development of a phenomenon. "Throwing a small stone may have some influence on the movement of the sun", observes Moisil. Does not anticipate it the modern "butterfly effect"? In another place, he refers to the involvement of continuous nowhere differentiable functions in the study of Brownian motion. So, chaotic systems and fractals are suggested to a contemporary reader. Let us recall that several decades later Brownian motion will be recognized as a strange fractal (whose Hausdorff dimension is an integer).

In one respect only, Moisil failed. He did not succeed to organize his life in order to make it more efficient. Moreover, he did not try this. Ho died at 67, when his head was still full of ideas and projects. He did not know how to alternate work and rest, how to pay attention to his health.

I remember my last meeting with him.It was in an evening of the spring of the year 1973. We left together the University and we were walking in the direction of his home, Armeneasca street, 14. When we arrived at his house, he told me: "You know that Sudan is the real author of the first recursive function that is not primitive recursive ?" (All treatises of mathematical logic claim that the author of such an example is G. Ackermann). Very interesting, I said. Where did you find this ? Then, Moisil said: "It is too late now, I will tell you this at a next occasion". This "next occasion" never arrived. Moisil left next days for Canada, where he died on 21 May 1973. Today is May 18. In three days we can say: Moisil died just 33 years ago. But my curiosity to find out what is behind the mysterious message left to me by Moisil obliged me to accomplish the respective research. Together with two young students, Cristian Calude and Ionel Tevy, we took piece by piece all the published papers of Gabriel Sudan. No of them had in its title or in its introduction something suggesting the presence of such an example. It is perhaps a rule of the nature that more interesting is something, more hidden it is and more effort we need to discover it. This was the reality. The respective example was hidden in the last part of an article which was explicitly concerned with a problem having nothing to do with a recursive function which is not primitive recursive. Clearly, Sudan was not aware of the fact, like Moliere's hero, Jourdain, who remained a symbol of such situations.

I had the happy opportunity to edit a part of the scientific work of Moisil, in three volumes published by the Publishing House of the Romanian Academy. Other writings of Moisil were published also after his death, some of them under the care of Viorica Moisil. I edited his "Lectii depre logica rationamentului nuantat" and his articles in the newspaper "Contemporanul", under the label "Stiinta si umanism". The articles published in "Viata economica" were edited in a small book "Indoieli si certitudini". Now, we have in front of us the duty to publish his papers of "mechanical grammar of Romanian" and his philosophical papers.

Moisil's heritage belongs to the Romanian culture and the new generations deserve to know this unusual personality.

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Born: March 1, 1925, Bacău, Romania. Elementary and high school in Bacau. Diploma of merit in Mathematics, University of Bucharest. Asistant Professor(1950), Lecturer, Associate Professor, Professor (1966) at the Faculty of Mathematics and Computer Science, University of Bucharest. PhD in Mathematics 1956, Doctor in Science 1967, Corresponding member of the Romanian Academy 1993, Full Member of the Romanian Academy 2001. Research and Teaching in Mathematical Analysis, Theoretical Computer Science, Linguistics, Semiotics, Poetics, History and Philosophy of Science, fields where he published about 50 books in Romanian, English, French, German, Italian, Spanish,Russian, Greek, Hungarian, Czech, Serbo- Croatian and about 400 research articles in specialized journals in almost all European countries, in USA, Canada, South America, Japan, India, New Zealand etc. More than 1000 authors quoted his works. He is recognized as one of the initiators of mathematical linguistics and of mathematical poetics. Hundreds invited lectures at various international scientific meetings. Member of the editorial board of several tens of international scientific journals.