THE FOURTH DIMENSION IN AUREL STROE'S MUSIC[1]

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SUMMARY. Dinu Ciocan is the one who found first similarities between the work of art and the fuzzy set, which is subject to gradual change. In compositional art, Aurel Stroe translates these notions into his music. This perspective is very adequate, especially as it belongs to the mathematical notions that are very close to the aesthetics of the work of art, which involves the poetic dimension, the ethics of the intentional ambiguity and the vague character.

Keywords: fuzzy sets, contemporary music.

The music of Aurel Stroe is one if the best Romanian works of art in the twentieth century. The aesthetic approach on the fuzzy sets is a way to touch the profound significations of his art. The explanations I have provided above refer to the way the mathematical arguments facilitate the understanding of the work of art, especially in the context of the twentieth century – when philosophy and art introduced "the primacy over the real". The Mathematics is useless within a world in which the possible does not take precedence:" if you take the real for granted or consider it unique, you miss that unit of the deeper mathematics. But if you double, triple or polymerize the real, if you dive into the ocean of the possible, then mathematics becomes a means to know, to explore the possible" [1]. The work of art is itself a reality meant to multiply reality – in a deeply entertaining way, which is not either photographic or mimetic. The musical masterpieces composed by Aurel Stroe are the best example to support the statement above, as they reflect a perspective of the possible, infinite world, as well as the marginal visions of reality. The composer's spiritual refinement is transposed to his musical work, which is the fruit of his approach on world and art and explains why these concepts can be identified naturally and organically into his compositions.

Prof. Dinu Ciocan is the one who found first similarities between the work of art and the fuzzy set, "which is subject to gradual change" [2]. This perspective is very adequate, especially as it belongs to the mathematical notions which are very close to the aesthetics of the work of art, which involves the poetic dimension, "the ethics of the intentional ambiguity and the vague character", the one which is open to many interpretations or does not benefit by the content precision" [3].

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There is an obvious compatibility between the mathematical notions and the phenomena, which are deeply related to each other, and the artistic background, as it is shown in the specialized literature. Goethe promoted the mathematic approach – as related to art – by pointing out the spiritual dimension of mathematics, which contributes to the development of the artistic creative phenomenon:" mathematics is an organ of the inner superior sense; practically, it is an art. Nevertheless, mathematics is not able to perform any moral act; a mathematician is accomplished only if he is accomplished as an individual" [4]. The end of the quotation made by the Romantic German artist makes the distinction between the artistic valuation of the artistic piece of work and its creator's moral profile, which proves to be so important. As one of the fundamental laws of aesthetics states," every aesthetic end product may not always be moral"; it proclaims the superiority of the spiritual quality over the aesthetic aspect.

(Non)Euclidean Geometry ("The Euclidean geometry is the perfect introduction to philosophy") [5]. The work of art has a lot in common with the philosophical conceptions of the non-Euclidean geometry, especially as regards the meaning of Aurel Stroe's composition work – which displays complex ideational understood implications. Euclid the famous Greek geometrician, lived around 300 B.C. and he was a professor in Egypt; among other works, it is worth mentioning his book "Elementele" ("*The Elements*") - a geometry manual - which contains individual theorems for the plane and special geometry, algebra and the theory of numbers. He promoted the logical reasoning and deduction and influenced Newton in his work "Principia". Today it is known that the Euclidean geometry is not the only independent geometric system due to Einstein's General Theory of Relativity ("the Euclidean geometry is not respected in vicinity of the black holes and the neutron stars, where the gravitational fields are very intense)" [6].

Mathematics is usually defined as the science that deals with the structure, the change and the space. A modern approach on mathematics states that it deals with the investigation of the abstract structures, axiomatically defined by means of the formal logics. The basics of the structures investigated by mathematics can seldom be found in the natural sciences, often in Physics. Mathematics defines and investigates its own structures and theories, especially to synthesize and unify multiple mathematic fields as a unique theory, a method that usually facilitates generic methods for calculation. Occasionally, mathematicians study some fields of mathematics strictly for the abstract interest generated; therefore, this approach is more related to the art than to the science. The specific domains of mathematics can be used to generically mark the limits of the trends approached by mathematics until today, in the sense of delineating three specific directions: the study of structure, space, and changes.

The study of structure generally focuses on the theory of numbers (the elementary algebra); the abstract algebra is the result of the deep investigation and abstracting of these theories (which studies the structures, which generalize the properties of numbers in the usual sense). The concept "vector", generalized in the sense of vector space and studied by the linear algebra is specific to both the study of structure and the study of space. The study of space naturally starts from geometry, from Euclidean geometry and the three dimensional familiar trigonometry which later on becomes the non - Euclidean geometry and plays an essential role in the theory of relativity. The study of change is a necessity especially in case of arts, where measurement and predictability of changing some variables is essential, as it reflects the dramatic background of the musical discourse.

The issue regarding the fourth dimension is not only a mathematical issue, but is also an aesthetical one. Nevertheless, nobody - excepting for the mathematician Howard Hinton who had intensively trained his imagination – has ever succeeded in getting a picture of a super-volume in a non-artistic act, with such significant expressive implications. All the great mathematicians, except for a few of them (Henri Poincare was ahead of them) agree with the fact that there is incontestably a four-dimension space. Nowadays a great number of scholars and philosophers are concerned with the issue of the fourth dimension. This issue replaced the interest people had for the squaring of the circle or for the perpetual mobile. To conceive the fourth dimension, we should leave away the strictly scientific, concrete dimension of the human universe which can be directly analyzed and study thoroughly the meanings of art.

It is known that the Euclidean geometry has three-dimensional, length, width, height or thickness. It was only since 1621, when due to the research made by Sir Henri Saville, that a new geometry, a non-Euclidean geometry was born as a consequence of certain obscure issues specific to geometry (especially as regards the parallel lines). This discipline was the result of the contribution made by Saccheri, Lambert, Gauss, Lobatschevsky (his research was highly appreciated by the scientific world), Bolyai, Riemann, Helmholtz, Beltrami and many others. The research of some of the reference works mentioned above proves the profound correlation between them and the musical phenomenon composed by Aurel Stroe, which has a unique interior geometry, developed according to other macro and micro formal laws than the ones commonly used in the modern composition art. The tragic feature of the paradox of the non-Euclidean knowledge" [7] is very well adapted to the aesthetic background approved by the contemporary art.

This new geometry indicates that space is no longer the Euclidean space. It is also obvious that we are able to understand various types of spaces which have different properties, where the parallel lines can meet, where the curve is not longer than the right, where the angles of a triangle scale down

unlimited while its sides become longer and other similar anomalies. This non-Euclidean geometry turns into a hyper-geometry or a meta-geometry, a theoretical background to investigate hyperspace, namely the fourth dimension. However, what is this hyperspace? Once this question is asked, there are difficult issues brought into discussion. Is it a space accessible to man, to his spirituality or is it rather the hypothetical space similar to Einstein's own space?

Here we are very close to the concept of infinity of the (aesthetic, expressive - our note) universe, which raises the following question: what is a bound? It may be more than "the extremity of a certain surface". The issue related to infinity is abnormally complex and out of the intricate network of numbers, of the abstract or concrete geometry; it is enough to remember the difference between "the undefined" and "the infinity". The mathematical infinity removes imagination and first appeals to reason. To conceive and reach infinity, reason does not have to cover the domain of infinity and waste the series of undefined bounds. It is enough for reason to find that a finite right line can be prolonged at both sides, also that any given number can be added to a unit and it notices that this thing is always possible, independently of the number or the line. The mathematic infinity is a kind of "spontaneous infinity", similarly to the artistic infinity; it is an infinity which is made up outside imagination and reason, which gives birth to the force of things, the infinite numbers or the projections of the superior geometry.

It is not easy to know or to define a hyperspace (from a cultural point of view, not from a geo-physical point of view). It is rather difficult to define the three dimensional space: the Kantian formula cannot be ignored, which states that space is a subjective (which is also true in the artistic domain), a required supposition of all the experiences. All the Kantian and Neo-Kantian efforts made by the idealist empiricists finish up by preserving the same obscure information on this issue. All the philosophers who were preoccupied with space and time (Spencer, Helmholtz, Renouvrier, James Sully, Stumf, Wiliam James, Ward, Stuart Mill, Ribot, Foille, Iuyan, Bain, Lechalas, Balmes, Donnan, Bergson and many others) were not able to solve the double enigma; their most controversial theories are still obscure against the shadows which do not belong to our world.

Hinton proved to be the most passionate researcher of the fourth dimension. He was not only a mathematician, more or less fanciful, who used to make fun of the thrilling game of the most daring hypotheses, but also a balanced man, gifted with a vast, unique imagination, which allowed him put forward viable theories for the majority of his abstractions. In addition to scientific works, he also wrote scientific literary works, but only some of them were successful. It is the case of the novel Stella, which tells the life of a young girl, who was made invisible by her father (he took the principle of the refraction of

light as a basis). In "The Fourth Dimension", the reader is led to the dark of the great enigma: the author pretends to have made some solid four-dimensional called Tesseracts that – in his opinion are a close transposition of a four-dimensional space.

This means that we have to train our conscience to look at things from another point of view, different from the conventional one: the artistic, aesthetic like point of view. Hinton stated that "when we meet infinity at a certain moment of our thinking, this is a sign that this way of thinking is related to a reality which proves to be higher that the one it adapted to". The space we usually conceive is limited, not in terns of surface, but in a way which cannot be "achieved" in case we think to measure the objects which are inside it. However, why does space have to be tri-dimensionally limited? The spiritual experience is the only capable of answering this question. We may experience the cultural existence (our note) of the fourth dimension; in a way or another, the human being is not simply a tri-dimensional (material) being. There have been put forward certain suppositions, which in an arbitrarily and artificially way provided a draft of the relation of our body with the existence of the fourth dimension; it states that our spirit is able to identify it. Our spirit can develop a superior conception of the four dimensional space, adequately to our tri-dimensional space and it can use it likewise. The only difficulty is to decide or at least to sense that there is a fourth dimension or even more in the universe.

The work of art is related to this temporal reality which contributes to the embodiment of the work of art and the cultural (even more, the spiritual) dimension which is in fact the fourth dimension (left aside by the mathematicians). In conclusion, Hilton assures us that we will never be able to see a four-dimensional figure physically, only with the mind's eye. The real, three dimensional and strictly material worlds is obsolete and it has to be replaced by non Euclidean properties by four dimensional space and time. The four dimensional world is not just a mere mathematical figure; it is the real world of physics, which was reached by following the same route the physicists had followed before in order to reach reality. Meta-geometry also looks outside our space for less conventional and subjective situations which have uncertain relations with the space we created (or which was created inside ourselves) in order to help us understand the phenomena of the universe.

"There is not only the sensual music; there is also a spiritual music. There is not only the music that is being performed at present, but also the eternal music, which exists even when it is not performed. All these lonely people have their silent music and I am glad that there is such music. However, where do people get the lonely music? They get it from us, the musicians, because it has to be first performed and listened to (…) so that any person can think about it and dream of it when he/she returns at home" [8].

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