Symmetry of STRUCTURE

an interdisciplinary Symposium

Abstracts

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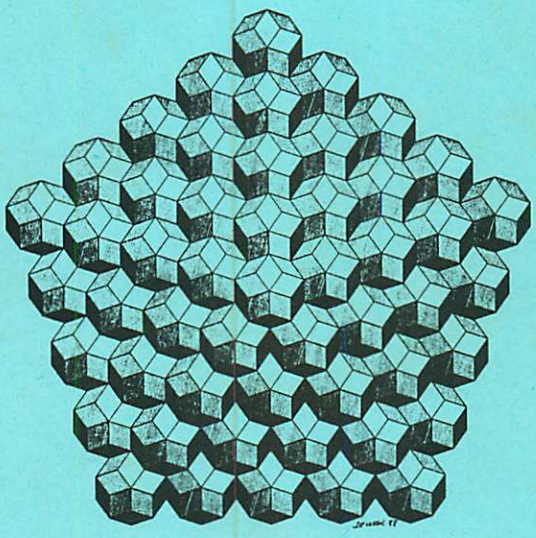

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DYNAMIC GEOMETRY

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Since my first book was published in 1975 *(The Measuring Numbers Systems)*, I had been expecting some feedback. Strangely enough, nothing happened. The book was distributed to major universities all over the country, and a few thank you notes were received for the book, but nothing more. Because of the length of time (14 years ago) I have a suspicion that in reality, nobody really knew what to do with the book's content.

It is a rather strange and very unusual experience to read this book. It does not fit into the accepted line of mathematics. I suspect that the learned minds of present day mathematics were totally confused and shocked to see such a publication appear for distribution. There is no reference in any of the world libraries where one could find an indication that the kind of development like the *Measuring Numbers System* is possible.

The *Measuring Numbers System* represents a totally new world of mathematics which falls outside of present-day mathematics systems. It is a very drastic departure from our present-day understanding of what mathematics really is, what its structure is and what the building blocks of the system are. I am convinced that we really did not pay enough attention to these facts because they seemed childishly simple and self-evident. I find them quite the opposite.

My investigation into mathematics would never even have been started, if I had not taken a very critical view of the basic ideas of the building blocks of mathematics. At this point, I came up with surprising discoveries of the nature of the foundations of mathematics and of science in general.

I am convinced that my present book will help to overcome these misunderstandings about my activity in this field and will help to start a concentrated effort to further develop the already known foundations of Dynamic Geometry.

I will tell you the story of what was on my mind when I worked on and developed Dynamic Geometry.

In 1958, I arrived at the time to take account of my past and decide what to do for the rest of my life. During the past several years, I had visited the local library to get some interesting books to read. The subjects were confined to different disciplines of science, such as physics, mechanics, mathematics, astronomy, philosophy, chemistry and others. I always enjoyed the freedom of the library's policy to freely browse among hundreds of books on the shelves. I was never short of interesting books to take home to read.

During those years, I had developed many new ideas about various subjects, and I felt that the time was right to make some serious decisions about which way I should direct my attention and settle down. So, in 1958, I made summaries about major scientific principles, such as physics, chemistry and mathematics. These three disciplines were the focus of my attention because I thought that in any of these three fields I would be able to do some serious work if I had to start anew.

Finally, I settled with mathematics because I felt I could accomplish the most in this field. First of all, I would not need to invest much money, only time. And the other surprising major discovery I made with my summary was the realization that with the proper work, and lots of luck, I might be able to make a major contribution to mathematics.

The discovery that I made was so overwhelming to me that I decided I would dedicate ten years of my life to try to develop the discovery I made. What was this unusual discovery I made with my summary?

My thinking started with the following questions:

Why is mathematics so important to our everyday life?

Why is mathematics so important to the sciences?

The only conclusion I could come up with was that mathematics is the only science which can give precise answers to the unknown, provided that the subject can be expressed with numbers. Mathematics has great logic behind it and a tremendous "order," an order which was developed through the millenia. These are the two great characteristics of mathematics: logic and tremendous order.

In very early times, the philosophers and other thinkers developed the idea of the Greek Democritus, that virtually everything here on earth, just as all over the universe is made of atoms. This atomic structure of the world idea was supported with the experiments of modern scientists. Besides, "nature" also produces animals, vegetation, atoms, molecules, particles, pieces and individuals in general. So, the existence of the atom is accepted as the true building block of everything around us. This atomic structure came to life in mathematics as "point structure."

In my study, mathematics is discussed in three major sections: GEOMETRY, NUMBERS SYSTEMS, and TOOLS.

In GEOMETRY, the building blocks are point and line. The point is dimensionless and has only one location in the field. The line has its length, and for this reason it is one-dimensional; however, it is made of an infinite number of points (dimensionless points). Its "point structure" is very important, as we will see later!

In our schools, we were studying the so-called Euclidian geometry. Geometry is confined to the study of one-dimensional lines, two-dimensional forms and three-dimensional objects' properties. Geometry was founded by the Greek Thale (Thales) some 600 years before Christ. Some 300 years later, another Greek, Euclid (Eucleides) collected all the mathematical knowledge of his day and published it in 13 books. Since that time, all over the world, geometry has been thought of as "Euclidian geometry," honoring his effort for his publications. Until very recently, we thought that only one geometry was possible, which is the Euclidian geometry.

Some 150 years ago, the Hungarian Bolyai, the Russian Lobachewsky and the German Riemann developed a new, previously unknown geometry, which we now call non-Euclidian geometry. This new geometry is confined to different curved surfaces. In general, we can say that the difference between the Euclidian and the non-Euclidian geometries can be characterized as follows: In the Euclidian geometry, the triangles always contain 180 degrees, on the contrary in non-Euclidian geometry, the triangles are either less or more than 180 degrees, depending on the surface characteristics, which are either concave or convex or a mixture of both. But one thing is common to both geometries, and this is very important: THEY ARE STATIC, IMMOVABLE, DEAD GEOMETRIES!

The next section of mathematics is the NUMBERS SYSTEMS. There is the very common base 10 number system with which we are very familiar in our everyday lives. There are the base 12, base 24 and base 60 number systems with which we are familiar through our time measurement, such as 12 a.m. or 12 p.m., 24 hours in a day, 60 minutes, and 60 seconds. There are the base 60 and 360 numbers systems which we use with angular

measurements. There are other numbers systems, but the most important is the base 2 number system which was discovered by the German Leibniz some 300 years ago. Only now has it become very important due to computer applications.

In general, we can say that our numbers systems are based on the COUNTING NUMBERS SYSTEM, reflecting "point structure," counting the individuals. One thing is also very important, that the numbers alone are dimensionless! It represents only togetherness. But the numbers are "dimensionless."

For example, we say "53." We realize the "53" is a number. Fifty-three what? Because it is dimensionless. We can say 53 apples, 53 large apples, 53 large red apples, 53 large red sweet apples, 53 large red sweet Jonathan apples. So, we see that if we add more and more identifications or characters to the numbers, we finally know what we are talking about. These identifications or characters are known in mathematics as "dimensions." But the numbers alone are DIMENSIONLESS. This is very important, as we will see later.

The third section of our mathematics is the TOOLS. There are the four basic processes: addition, subtraction, multiplication and division. There are also the powers, roots, the different tables, logarithm, vectors, trigonometry, algebra, integral and differential calculus and other elements — and the computer. This summary is not complete, but gives us an overview of the subject's characteristics.

In general, we know that everything is TRUE here on earth, just as well as in the whole universe and it is part of our mathematics, through different "equations" and "formulas." We believe that other truths are nonexistent. Truth can only be ONE. There cannot be two truths at once. It is a contradiction.

In summary, our present-day mathematics is built on a "STATIC GEOMETRY" and on a "COUNTING NUMBERS SYSTEMS," where the numbers are "DIMENSIONLESS," and the whole mathematical system represents an atomic structure and a point structure, which in turn expresses a "ONE TRUTH WORLD" idea. There is nothing wrong with it; after all, it has served us well for over 4,500 years.

The great realization of my study in 1958 was, if our mathematics is built on a "static geometry" and a "dimensionless numbers system," why can we not have a "DYNAMIC GEOMETRY"? The "Dynamic Geometry" is missing, it is nonexistent!

This was my great realization in 1958. The question of why we do not have a "Dynamic Geometry" was a major discovery for me.

The answer to this question was because it is too complicated. It is so complicated that it became unimaginable to the human mind. It is left to God's domain. After all, we have a finite mind, and we cannot digest the infinite that is too complex. This is the reason we have to have religion, to have and answer to the unanswerable, for our finite minds. This is the final answer to all our complex problems. Without this safety valve we might become insane.

For me, the question of "Dynamic Geometry" had become an obsession. It was a worldly task to spend some time of my life to try to find answers to this important question, to try to discover Dynamic Geometry.

In this respect, 1958 was both the decision and starting time. Because I was a mechanical engineer and not a mathematician, this task to develop a new basic idea in mathematics was gigantic. It seemed impossible to invent and develop a new mathematics. The best that I could do was to go back to the library and find a book on the subject of "how to invent mathematics." Of course, I could not find one. Then a good idea came to me: suppose I studied the great masters' lives and works, and I might find the way they came to their discoveries.

After almost a year of study, I found that every one of them made their discoveries in their own way. So, if I wanted to develop Dynamic Geometry, I had to do it alone, without help. To do it the best way possible, with the logical events of a step-by-step approach.

My task is now to show you how I developed my original idea from the very beginning, step by step, so later generations will have an insight into my thinking. Perhaps they can use this method of thinking with their work, regardless of whether or not they have a complete knowledge or experience in the field of their interests.

What are the foundations of Dynamic Geometry?

What are the building blocks of Dynamic Geometry?

All during the year of 1959, I looked for the basic ideas of Dynamic Geometry and for the building blocks of the system. By the end of the year, I had developed the basic ideas that looked reasonable enough for me to start my task.

The basic ideas were: space, time, energy, movement, growth and direction — I thought. The question then arrived: Now what can I do with these basic ideas?

In engineering, when we invent some gadget, we patent it and try to sell it to someone. To do this, we have to have a prototype of the invention to help explain its properties and its functions to the prospective buyers. It looked very reasonable to me, to do the same for my mathematics. I simply had to find a prototype or a model which contained all the basic properties of Dynamic Geometry.

After some time, at the end of 1960, it occurred to me that an expanding globe or an expanding balloon would be the model because each contains all the properties of Dynamic Geometry. The rest is history.

The discovery, development and application of Dynamic Geometry is a new starting point in human history. We have discovered a New World of Truth which is totally different from the present-day mathematics. It is different, because it is built on a new foundation. It is built on "continuity" instead of "point structure." Continuity is the foundation of this New World, which contains everything that is moving and changing around us. It is new, and yet it is old, because we realize that everything is moving and changing around us. Everything is in flux. Nothing stays, standing as immovable, or as static as our present-day geometry!

We have arrived at a New World of understanding based on "World Reality"!

This World Reality is expressed through Dynamic Geometry. This new Dynamic Geometry is a multidimensional world, because it contains the basic ideas of space, time, energy, movement, growth and direction, and that is just the beginning. All these basic ideas manifest themselves all at once. Always together. It is very complex, yet it expresses itself in the most simple way imaginable. It is a major breakthrough in science in general, and in mathematics in particular.

The following discussions will bring to light how this wonderful world of mathematics came alive, step by step. It is ironic that this important discovery came through an outsider whose persistent curiosity found the key to this totally unknown, untouchable world of reality.

The most important aspect of this discovery is the "new dynamic field" (the expanding globe or balloon) that we are

familiar with by now. This is the basis for my three published books.

The first positive result of the study of the new energy field brought to life *The Measuring Numbers System,* published in 1975. It was followed by the book entitled *Fundamentals of Dynamic Geometry, the Fejer Vector System* (1981), which is a new vector system, that is multidimensional and has a memory. This new vector system is used to decipher the dynamic field's properties. The third book, entitled *Time in Dynamic Geometry,* is also based on the new energy field's property. As such, it can be viewed as the Universal Time Theory because it contains all previous time theories which are based on the propagation of light (speed of light) and are hopelessly deadlocked and contradictory. With the use of the new energy field, everything is now falling into the proper place.

To use the new dynamic field for later investigations, it seems to be possible to unlock many other secrets of nature which are presently baffling our minds. This is one of the important aspects of the discovery of "Dynamic Geometry."

To make my point very clear to you, it is necessary to review the history of mathematics. Mathematics started some 2,500 years before Christ in the Valley called Mesopotamia at the Tigris and Euphrates rivers in the City of Ur. By 600 B.C., the foundations of geometry were established by the Greek Thale (Thales). The counting numbers system was developed in 500 B.C. by another Greek, the philosopher and mathematician Pythagoras. Everything we know today in mathematics is based on these foundations.

The discovery, development and application of Dynamic Geometry represents a turning point in mathematical history. The present-day static geometry, the dimensionless counting numbers system and the "One Truth World" idea with its atomic structure has come to an end. The 4,500 years of present day mathematics up to 1975 has ended. A new world of mathematics based on World Reality has come alive. This New World is the Dynamic World. Everything is moving, everything is changing, always in flux. This is the "Dynamic Geometry's World," a new multidimensional world, a new beginning. This is the essence and meaning of my work. If you cannot grasp the meaning of this fundamental departure from present day mathematics, you will never be able to digest any of my books.

The following is a short review of the history of our civilization. Scientists think that human existence here on our Earth started 3,000,000 years before Christ. Nothing significant happened until 7000 B.C., when agriculture was invented. This age is the Old Stone Age, from the very beginning until 7000 B.C. The next turning point was the emergence of civilization around 3500 B.C., the age referred to as the New Stone Age. Human beings used stone tools as extensions of their mental and physical beings. Given the significance of tools as technology - and all that technology has come to mean for human growth and power - it is fitting that the past "ages" of man have been identified and classified according to the development of "tools."

So we started with the Old Stone Age from 3,000,000 B.C. to 7000 B.C., and then the New Stone Age from 7000 B.C. to 3500 B.C. The discovery of bronze made drastic improvements to tools, making them sharper and more wear resistant. From 3500 B.C. to 1000 B.C. was the Bronze Age. The great discovery came with the use of iron around 1000 B.C. The Iron Age lasted from 1000 B.C. until the turn of the century, 1900 A.D. From 1900 A.D. until now we have been in the "Steel Age."

Just a reminder that the New Stone Age and early Bronze Age men had a very comfortable life and highly developed culture. They built the pyramids in Egypt and showed remarkable human developments in many scientific fields.

The discovery of iron is credited to the speeding up of human development all across the human spectrum. The iron tools became refined through the blacksmiths' hard work. Wrought iron was the main reason for advanced iron tools and weapons development. Through the burning and hammering of the heated iron pieces by the blacksmiths, the iron lost it high carbon content and virtually become a steel piece.

The Iron Age lasted until the invention of steel manufacturing by the Englishman Henry Bessemer, who invented and discovered steel manufacturing in 1856 and built his first furnace in 1860. The historians fixed the Steel Age starting time at 1900 A.D. The Steel Age's arrival caused drastic consequences in human history. The light, flexible and very strong steel, which by now can be produced in large quantities, made it possible for the development of new, powerful, light engines. These engines were placed in cars and airplanes and freed man from simple hard work. The machine age came alive in full blast.

Since 1900 the advancements have been phenomenal in all fields of science. Discovery of radioactivity by the French Becquerel in 1896, and radioactivity in thorium discovered by the Curies in 1898, started the modern atomic age. In the USA, Henry Ford built his first automobile in 1892 and started the automobile age. The Italian Marconi invented the wireless telegraph in 1901, and later the radio, starting the electronic age. In the same year the Wright brothers made their first powered flight, starting the aviation age. Einstein's relativity theory gave a new start to physics. World War I enhanced the developments in many new fields of science. In 1936, the television came alive. During World War II, in 1942, the Italian Fermi made the first uranium pile with its self-sustaining fission reaction and started the atomic reactor age. In 1945, the atomic bomb was developed, and in 1950, the hydrogen bomb was introduced by Dr. Edward Teller. In 1945, the first computer was built, and in the late 1940's, the transistor was invented, starting the computer age.

In 1957, the Russian space capsule orbited the Earth, starting the space age. In 1969, the USA landed on the moon's surface, signifying the beginning of the space flight age.

Finally, in 1975, Dynamic Geometry was discovered and introduced by Paul Haralyi Fejer, closing the present day mathematics, which is built on "point structure," static geometry and the counting numbers system, and lasted from 2500 B.C. until 1975 A.D.

The new age in mathematics is the Dynamic Geometry Age, which is built on a new energy field and a multidimensional system, expressing space, time, energy, movement, growth and direction, — everything at once. This new mathematical system consists of Dynamic Geometry, the measuring numbers systems, and as a tool, the Fejer vector system to evaluate the energy field's properties. A new, universal time theory based on the new energy field's properties has also been developed.

All these new developments came from the new point of view called "World Reality." This new World Reality consists on one side of the present day philosophy with the atomic structure, point structure and the present day mathematics, with the "One Truth World" idea, and now on the other side with the discovery of Dynamic Geometry, a new multi-dimensional "World of Truth."

This is the meaning and the importance of the discovery of Dynamic Geometry. It signals the end of the present day mathematics and gives a new start for the totally new world of mathematics with the introduction of Dynamic Geometry, which is based on a new World Reality.

Paul Haralyi Fejér