

A Mathematician's
Search for
Technologies of
Understanding the
Universe

A Mathematician's Search for Technologies of Understanding the Universe

Edited by

Helen Thrift, Yuri Stropovsvky
and Francisco Bulnes (Honored)

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PREFACE

The following book is the second part of an authorized biography of Francisco Bulnes, Doctor of Mathematics. He has shared some of his academic trajectory and life experience with us in several diverse interviews, keynotes, speeches, international conferences, publications, books, scientific papers, and seminars, which we consider to be interesting and full of knowledge.

Doctor Francisco Bulnes has been a universal mathematician, which is something that he inherited from his great teacher, Doctor Félix Recillas-Juárez, founder of the Institute of Mathematics of UNAM¹ and inspirational mathematician. Doctor Francisco Bulnes has made many contributions to the fields of physics and mathematics. He is considered to be an authority in several areas of mathematics, such as algebraic geometry, mathematical physics, global analysis, and infinite Lie theory

In addition, he has made several new advances in applied mathematics and nanotechnology. He has also made contributions to nanomedicine, nanomaterials, quantum electrodynamics, photonics, spintronics, and advanced electronics. He has developed sensors and transducers in the latter. This was because, as he has said, sensors are the nerves of the Universe and transducers are its enzymes and mitochondria.

His best academic work demonstrates the simplicity in the mundane. His alumni, partners, colleagues, and friends all state that he has charisma. Also, he shares his knowledge and helps others who want to expand their conscience. Doctor Francisco Bulnes says, “mathematics is the most human science, because it is the creation of the human intellect”. He also believes that “mathematics is the Creator’s natural language, which was made with the Universe”. We are aware of the order of the Universe. The human mind can be a receptor of the universal mind.

The fight to do science in an underdeveloped country is incredibly hard because the scientist is confronted with corruption and the country’s prevailing policies. This even applies to the interests of foreign countries

¹ UNAM (National Autonomous University of Mexico)

and the currently imposed educational models, which are far from Mexican reality.

Dr. Francisco Bulnes' fight has been especially hard. He wants Mexican science education to form a fundamental base to the search for truth, and to generate new and objective knowledge in order to create innovative technologies.

The Chapter Authors

CHAPTER 1

UNDERSTANDING THE HUMAN ASPECT OF A MATHEMATICIAN

MARÍA ELENA BULNES¹

1. A mathematician's personality

Many years ago, I knew a very interesting person. When I saw and heard him for the first time he, like me, was direct in his manner.

We met at an intellectuals' gathering. We had a certain affinity between us, although I must mention that, for one moment, his tone of voice made me feel disconcerted because it seemed a bit strong and decisive, but I soon understood that his voice indicated security.

I was familiar with different personalities because I had worked in different enterprises, including a German one. We all know what the Germans are like.

When he mentioned that he had studied mathematics in UNAM's faculty of sciences, I then understood his personality because I had heard that mathematicians and physicians have an introverted character but that they are also strong.

But there is no doubt that a human being can be understood in more depth. Moreover, I began a friendship with Francisco Bulnes that made us both feel good and we became closer. We had diverse talks, which obviously included mathematics and its applications.

The friendship between myself and Francisco Bulnes only lasted fifteen days before he asked me the following: "What you are looking for? What

¹ Executive Subdirector of Olympia in Germany and Mexico (1991–2001) and Dr. Francisco Bulnes's Wife.

do you want? What is your project in your life?" I answered: "I feel very good with you; I think that we are compatible and together we can have a good life." And we began our romantic relationship.

Over time, I became involved in the scientific world because Francisco Bulnes invited me to national and international congresses, meetings, and conferences.



Figure 1: My husband and I during a mathematics congress in Tuxtla Gutierrez, Chiapas, which was organized by SMM (Mexican Mathematical Society). My husband participated as speaker in the mathematical physics section. We are at the Camino Real Hotel after his talk [1].

I observed at these events that scientists came from diverse countries and I was able to see and hear their talks and explanations.

I need to clarify that mathematics is not my best area, and the events which Francisco Bulnes organized were much more advanced than my knowledge of the subject. For example, he was the principal chairman and first adviser during four consecutive years of the *Applied Math*, which was the most famous international applied mathematics congress in Mexico. This took place annually from 2005 to 2008 [2].

I understand the universal importance of mathematics and their impact on modern science.

Also, I believe that there are scientists who have much passion and this is what Francisco Bulnes managed to share with me. His passion led me to

have an interest in mathematical formulas and theories.

Francisco Bulnes explained the importance of mathematics to me in a simple and sensory way.

I have learned that the mathematics is the base of everything.

As spectator of the scientific world, I have seen that good scientists have a serious character and they have goals. They are also focused, disciplined, direct, and incisive in their research.

But I must mention that all good scientific researchers have a human side as sometimes they can be arrogant, presumptuous, or have other natural flaws.

The reality is that all exist in the Lord's vineyard.



Figure 2: Dr. Francisco Bulnes giving a mathematics research talk at an international meeting. I took the photograph. This conference was at Querétaro Autonomous University [3].

While presumptuous scientists exist, there are also scientists with serious characters and kind personalities.

2. Metaphysics

I have always been fond of psychological studies that consider human behavior and its causes.

Eventually, I married Francisco Bulnes. This meant I had more opportunities to learn about metaphysics and its importance to religious concepts, as well as its applications in life. I was previously uneasy about how some ideas from modern science, such as energy, will, time, evolution, emotions, and the mind, stem from God's fundamental energy.

I am strong believer in God, and so is my husband. He always says that *Quantum mechanics is God's science*.

He says that quantum mechanics describes the Lord's actions when he creates or destroys elements of the Universe. He has given it an order and made nature beautiful.

In particular the variants of the human behavior are the effects of a world that exists beyond the matter that surrounds us.

He studies quantum electrodynamics and spintronics in order to understand their variations and their relationship with a stable mind. He believes that anxiety caused by space is due to fragmentation in the mind's quantum region. This is the principal cause of the instability that affects conscious behavior.

The evolution process is also very important because energy can be created or folded.

My husband explained the fundamentals of perturbation theory to me [4]. He explained how something can appear to be chaotic wave in the free transition of an event; this occurs when a particular symptom is presented.

For example, if a friend brings past facts or circumstances into the present, then the energy from a different time creates a chaotic wave in the future. This means that all future solutions will be chaotic and lead to negative consequences.

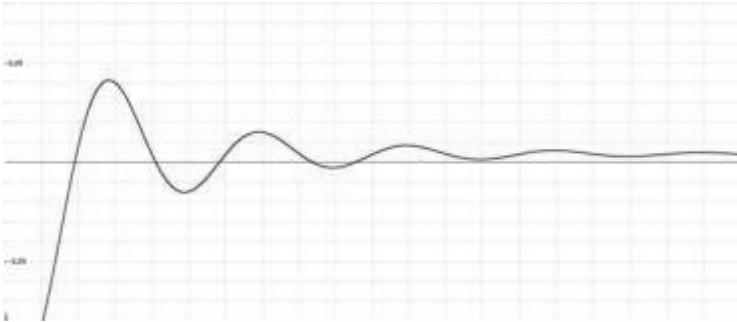


Figure 3. The normal evolution of an event, which creates an equilibrium. However, we want to generate events that have a great significance on our lives and which mitigate negative effects.

I have discussed and analyzed these themes with my husband. He has taught me how to understand life through a mathematical lens. I now understand how the Universe uses mathematics to function and how it deploys the energy contained within it.

3. Understanding the beauty of nature

Another aspect that my husband has taught me is nature's implicit order, which obeys the mathematical rules created by the Universe.

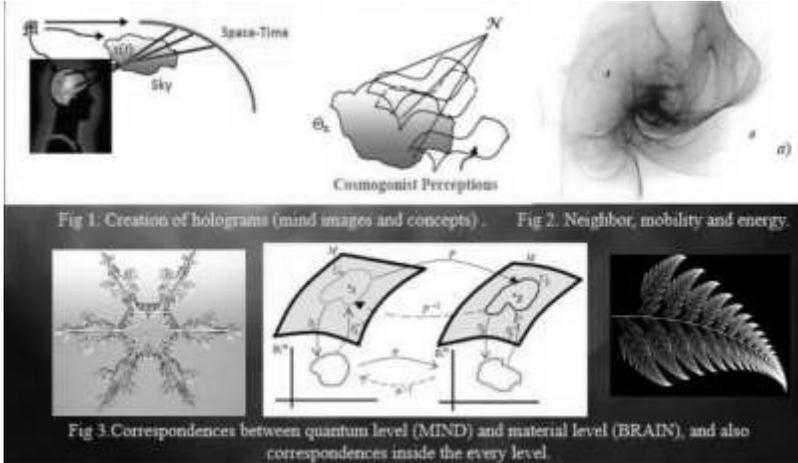
However, my husband also taught me that mathematics was created in the human intellect. However, is it merely the creation of the mind and a result of man's intelligence or does it exist in all of the Universe's phenomena?

If we consider metaphysical studies and the wisdom of Kabbalah, we will find that mathematics can be the essence or the cause of the implicit order created by God. However, the human being is the Creator's creation, and, as they are a part of Him, they reflect His intelligence. But, according to the practice of Kabbalah, the cause and effect are the same. This means that the perfect order found in nature and the Universe have always existed and they now appear in man's mind as he is God's creature.

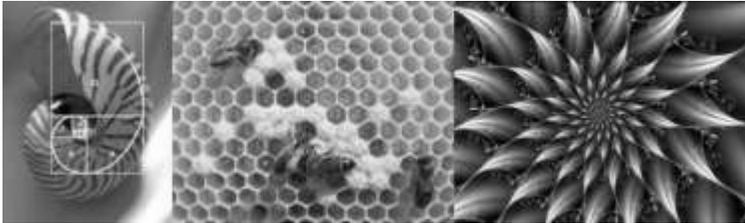
This is the same for trees and their seed. A seed is planted to create a tree. The tree grows and develops fruit, which also contain an original seed [5]. The cause and the effect are the same. The order established in the Universe (the tree) is created by God, who has the seed (the implicit order given through mathematics), which represents the mind. However, mathematics

exists in all creatures because their inherent structure has been designed by the Creator.

A)



B)



C)

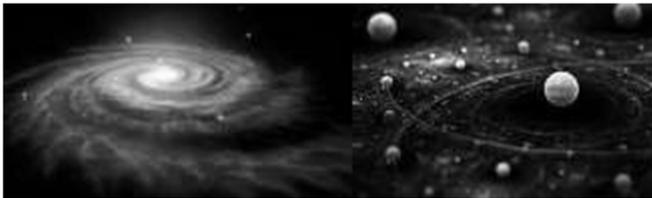


Figure 4: A). Examples of mathematics in nature. B). Perfect geometric structures in nature [6]. C). The Universe has a perfect geometric structure.

There is lots of evidence that other creatures are also mathematical; for example, bees are able to create geometrically perfect structures and plants have a mathematical code imprinted on their conscience. This provides major evidence that everything has been designed by God's wise mind.

Their magnificence is shown in all its glory.

I should also say that my husband, although a scientist, has always recognized that scientists are like boys discovering the Universe's natural perfection.

CHAPTER 2

THE FIGHT FOR SCIENTIFIC DEVELOPMENT AGAINST THE INTERNATIONAL INTERESTS OF MONEY AND POWER

DR. YURI STROPOVSVKY¹

1. The Fighter in Mathematics and Science who Breaks Paradigms

In the preface and the introduction to this book, some important aspects have been mentioned about Dr. Bulnes's characteristics and qualities as an academic, which have led him to break the establishment's boundaries.

The science world is not a less troubled world than any other societal group. It is important to avoid egocentrism, selfishness, and professional jealousy.

Scientific maturity is achieved with a postgraduate degree, as well as other superior and advanced studies. However, problems can still follow in other spheres such as a lack of money for the development and creation of research prototypes.

In addition, payment is required to appear in indexed publications in recognized journals belonging to prestigious publishing houses.

Additionally, many politicians fail to understand the importance of science to society's development; this is a situation that is more evident in underdeveloped countries.

Dr. Bulnes has said that "a real scientist must chase knowledge through the

¹ Department of Mathematics, Lomonosov Moscow State University, Russia
stropovsvky@yahoo.com.

truth”. Actually, in the academic world there are a lot of imposters due to the proliferation of communication media, such as television, radio, and internet, which all create intellectually inferior material.

It is essential to hold scientific and academic events, which discuss the latest developments in the field and allow the opportunity for researchers to be questioned by their peers.

Developed countries, such as the United Kingdom, the United States of America, France, Germany, and all the countries in Eastern Europe, hold an enormous number of scientific events. These countries have shown that it is essential to disseminate knowledge internationally in all fields. Furthermore, in these countries people are in the habit of reading books, journals, newspapers, and informative documents, which have been analyzed and approved of by their society.

In the case of an underdeveloped country, such as Mexico, the interest in science and technology is limited by the political landscape. There is also an economic factor, which leads to a lack of development and innovation.

The government will only invest a limited amount in science and technology.

In addition, technologies such as hydrocarbons, would be affected by the current plans to reduce the use of oil plants. It is important to note the new sources of energy and clean technologies (renewable technologies) that have recently emerged. It is hoped that these developments will generate a revenue for countries that invest in science and technology.

2. New Research Methods

Mathematics and physics generate new knowledge through theories and a “true propositions set”, which has been discussed by Dr. Bulnes in his research dissertations [7, 8]. Mathematics proves the consistency of these theories.

“Nesting” the sciences (see Figure 5) refers to the essential study of particular concepts.

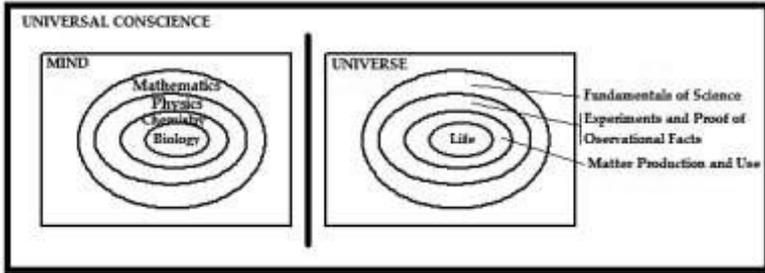


Figure 5. Nesting the sciences. Mathematics helps us to understand the physical Universe and infinite dimensional spaces. In physics, we only study four-dimensional spaces. Modern physics, which uses string theory, has opened up more dimensions.

It will always be necessary to understand concepts and the theories, as well as the algorithms that need to be applied when developing technological prototypes [7, 8]. The interaction of the two “nesting” examples shows an evolutionary behavior.

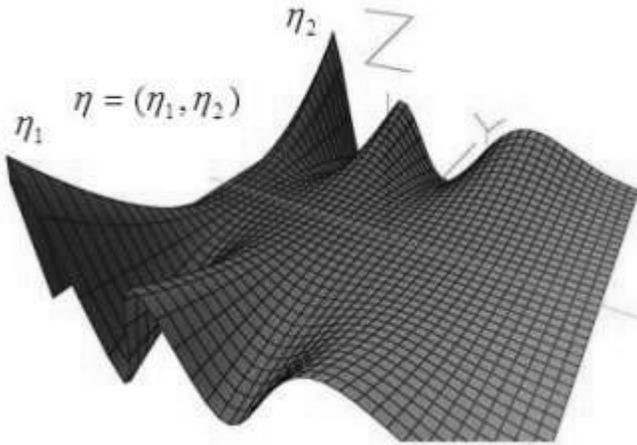


Figure 6. Model of the uniformity of space-time [9]. This model can be applied to equilibrium of the conscience. The two initial particle states could represent the emotions and rationality. All fields and interactions in the Universe are focused on unification.

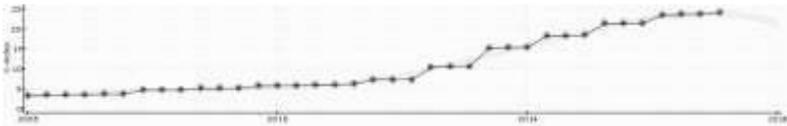
From the point of view of particle physics, this can be re-interpreted as the unification of time and space, which exist in a fragmented Universe. Their union is known as the Universal Conscience, which is defined as energy or

fundamental light. But what happens with this fundamental light in terms of scientific development? It is necessary to consider a way to unify science and conscience in order to develop new technologies.

The scientist must publish many papers and give many talks. But why should they do this? Is it for money or their career? The answer is neither. The true scientist must focus on the search for truth and the development of knowledge for future generations.

Research can be measured by the “academic index” (see Dr. Bulnes’ results in Figure 7).

A)



B)

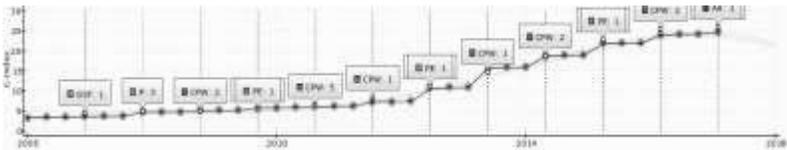


Figure 7. A). Dr. Francisco Bulnes’s “academic index” for the last 13 years. This graph has been generated by Thomson Reuters. B). The graph shows the amount of “high impact” journal articles published on mathematics per year [10, 11].

There are several applications for mathematics; these include medicine, mechanical engineering, electronics engineering, nanotechnology, theoretical physics, cosmology, and spintronics. Dr. Bulnes is well versed in many fields thanks to his research methodology. Pure mathematics research is very hard.

The director of the National Polytechnic Institute (the José Enrique Villa Rivera [2004–2008]) invited Dr. Bulnes to be the director and principal chairman of an international applied mathematics event for over four years. This involved applied mathematics, which has a wide range of research areas, including cybernetics, optimization, econometrics, hyper-fluids, quantum computing, electronics.



Figure 8. A masterful talk by Dr. Bulnes, which was published in 2007 by the Journal of the National Polytechnic Institute. They also announced an international conference of applied mathematics in their third edition. This international event was directed by Dr. Bulnes. Dr. Bulnes arranged the publication of the conference proceedings [12, 13].

The IPN Director agreed with Dr. Bulnes that the conference proceedings should be published. The papers were published in more than twenty books, which were luxuriously presented. Famous mathematicians, such as Dr. Michel Shapiro, acted as the section editors.



Francisco Bulnes (Ed.)

Post-Doctoral Seminar on Spectral Curvature and Spectrum of Curvature

постдокторский семинар Мексика-
Россия-Украина на Спектральное
Искривление и Спектр Искривления

Figure 9. Seminar directed by Dr. Bulnes [14].

Dr. Bulnes and Dr. Shapiro are good friends (see Figure 10) and together they organized a special publication of pure mathematics research (see Figure 11).



Figure 10. Dr. Bulnes (right) with his two good friends: Dr. Michael Shapiro and Dr. María Elena Luna. Dr. Bulnes invited them to visit his laboratory in Chalco, Mexico, and Dr. Luna gave a talk.

Other scientists and mathematicians spoke at this event including Dr. Juan Bory, Cuba; Dr. Nikolai Vasilevski and Dr. Vladislav Kravchenko, Russia; Dr. Dominique Julien, France; Dr. James Paul Cladwell, United Kingdom; and Patrick D. Wiedman, United States of America.

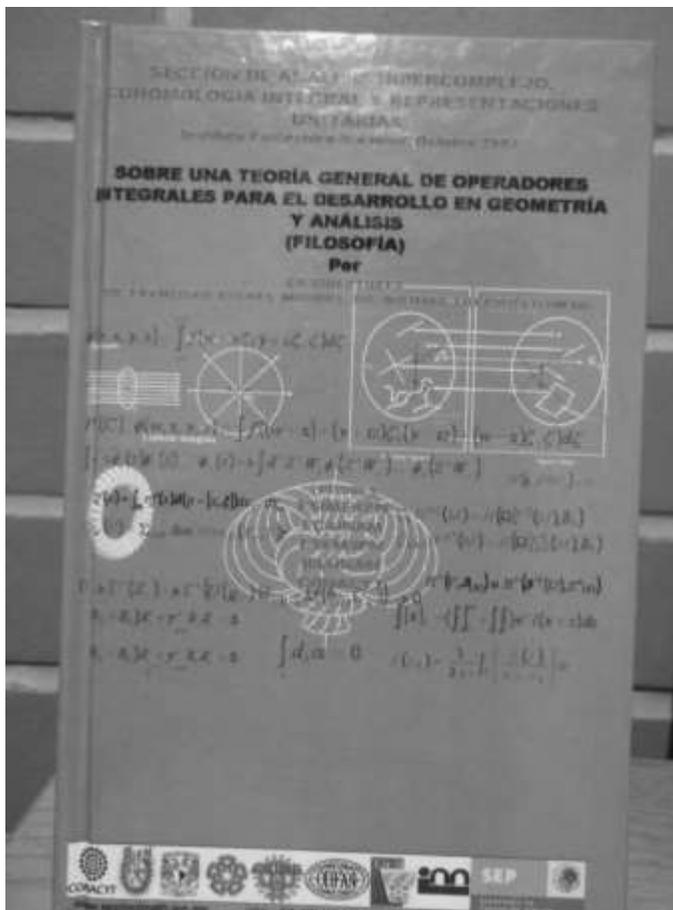


Figure 11. Monograph entitled, *Applied Math III*. Edited by Dr. Francisco Bulnes and Dr. Michael Shapiro ISBN 978-970-36-0442-5 [15].

I was a reviewer of proceedings papers and member of the editorial board. I was also a principle member of the organizing committee.

Dr. Wiedman, from the USA, came to Mexico with his own resources. He was dedicated to the conference and he has a great deal of critical sense. Dr. Juan Bory Reyes gave an interesting talk on pure mathematics. Dr. Kravchenko, a friend Dr. Bulnes, also participated meaningfully and gave a talk on differential equations and functional analysis. Dr. Paul Cladwell participated in the editorial board (see Figure 12).

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Figure 12. Promotion for the fourth issue of “applied math”.

Dr. Bulnes argues that it is essential to open up different mathematical themes to the international scientific community and the public. He believes that we should create research seminars to increase knowledge. The seminar was created at the University of Göttingen, Germany. Dr. Bulnes has directed seminars that have focused on specialist areas of knowledge (see Figure 13).

Seminars are about increasing knowledge through the active participation. This leads to the creation of new theories and laws (see Figure 13).

Through consider a Riemannian manifold as a classes space G/H , where G/H is a space of left and right invariant classes modulo an isotropy subgroup H , are studied and developed methods in integral geometry to measure the curvature of G/H , through their orbits, cycles, co-cycles, field ramifications, etcetera, obtaining geometrical invariants as images of integral transforms that define the topological nature of the space. Several of these geometrical invariants are product of embeddings in topological vector spaces on the Riemannian manifold. The Spectrum of curvature will be of sheaves with curved germs or that include the curvature tensor. Then can be established an algebraic scheme related with equivalences of the moduli problems in field theory between the geometrical invariants and spectral images of curvature. Finally, this can be generalized to the quantum context to obtain and design an advanced censorship to possible advanced devices to detect and measure quantum gravity using the second curvature.

Figure 13. Contents and goals of the Mexican-Ukraine-Russia seminar [14].

3. The Hard and Difficult Work of an Editor-in-Chief Work

Editorial work is very hard because it is necessary to read a great deal of information. The responsibilities of an Editor-in-Chief are listed below:

1. The Editor-in-Chief must spread scientific research both inside and outside of the country, and hold conferences for national and international researchers.
2. The Editor-in-Chief must have meetings with the journal's editorial and reviewing committees to establish strategies to increase the journal's circulation.
3. The Editor-in-Chief must comply with the publication conditions established by different doctoral programs.

4. The Editor-in-Chief must read the submitted works with great care and find reviewers who will make a judgment on the quality of the manuscripts.
5. The Editor-in-Chief must obtain citations.
6. The Editor-in Chief must ensure the journal is registered in the international records.
7. The Editor-in-Chief must produce four issues per year.
8. The Editor-in-Chief must publish the work of different authors.
9. The Editor-in-Chief must work with various prestigious research institutes and universities.
10. The Editor-in-Chief must check the authors' ethics and ensure that they have not plagiarized, manipulated data, made their results up, or committed any other malpractices.
11. The Editor-in-Chief must ensure there is no conflict of interest.
12. The Editor-in-Chief must perform administrative tasks.

Editorial work is very serious and prestigious. Dr. Bulnes has sat on several international scientific committees. This has led to Dr. Bulnes obtaining his PUBLONS award [11].



Figure 14. Certificates [11].