SPIRITUAL LIFE ENRICHED BY NEW KNOWLEDGE

Mirko Dejić (2013). Number, Measure, Immeasurability.

From Mathematics to Anthropology (in Serbian).

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Two previous books by the same author (from 1990 and 1995) and his scientific and professional papers published between 2001 and 2012 in various periodicals and annuals form the basis of this book. Nevertheless, it cannot be said that this book represents the collection of the chosen papers or anything similar. It is the result of the serious effort of the author to give a critical review on the mentioned books and papers, to systematize them, and as far as it is possible, to make them comprehensible to wide scope of readers. The author, Mirko Dejic, particularly stressed their general cultural significance, and the strictly professional component became secondary issue. We are sure hat in this way, the author gave his contribution to positioning Mathematics as an integral part of general culture, its position belonging undoubtedly to it along the significant periods of the development of humankind. Nowadays this position is being impugned, although in the conditions of IT development and fast technological growth, it should be otherwise. Apart from this, a significant part in the book is devoted to the status of Mathematics in reality of Serbia, general and educational, as well as presence and influence of Serbian Mathematicians and other creators in Mathematics development and its applications worldwide.

Texts in the books are formed within three chapters: *I Philosophy of Mathematics; II History of Mathematics; III Mathematics and Religion.* We are going to try to reveal the contents through brief reviews.

At the very beginning of the first chapter, in the sub-chapter Mathematics, there is a short review of efforts of Mathematicians, and not only them, to come to rational, widely accepted definition of Mathematics as science and universal actions of a sensible being as the man is. The reader, reading many definitions, by the rule adjusted to the needs or subjective relation of the individual, will see that generally accepted definition does not exist. We are going to be free to add to the definition a sentence written by a famous German-American Mathematician Richard Courant (1888–1972)) (paraphrasing): "The active doing of mathematics will help us to get the answer to the question: What is mathematics?". In the second chapter, *Nature of Mathematical Knowledge,* the author deals with the questions of building deductive mathematical systems. With the example of axiom based geometry, from Euclidean to non-Euclidean, he points at the significance of creators of the non-Euclidean geometry from traditional loyalty to perception experience, which resulted in significant encouragement to creators in Mathematics and other scientific fields to found new scientific disciplines, and build up new theories. This is how, for instance, in theoretical physics, theory of relativity and quantum physics appeared. In the chapter *Nature of mathematical being,* a review of some philosophical learning (Platonism, constructivism, intuitionism, nominalism, realism and formalism) is given, first of all through description of bases of attitudes about origins and essence of mathematical objects and relations between them. The third chapter is *Mathematical creativity.* The significance which M. Dejic gives to this chapter, the way it is being discussed, the scope and attention relating to the issues in question, we can recognize his life vocation towards revealing and nourishing the gifted young mathematicians, their careful leading to the level of knowledge and devotion to Mathematics, in which their mathematical abilities

will enable them to create within its frames. Carefully chosen examples illustrate various aspects of the way from spotting the problem to enlightment, through which discovery appears and in this way to the realization of creators' tendencies.

The second chapter starts with the sub-chapter *Short review on the historical development of Mathematics until Dekart,* within which M. Dejic, accepting periodisation of the historical development of Mathematics of the eminent Russian mathematician A. N. Kolmogorov (Андрей Николаевич Колмогоров, 1903–1987), showed development of Mathematics through the period of its foundation, development of elementary Mathematics, through the Mathematics of variable quantities and the period of contemporary Mathematics. In the next chapter, this review became richer because of the biographies and works of antique mathematicians: Tales, Pythagoras (Πυθαγόραζ), Plato (Πλατων), Euclid (Ευκλειδηζ), Archimedes, Eratosthenes, (Ερατοσθενηζ), Heron (Χερον), Diofant (Διοφαντοζ)... The next two chapters are devoted to Serbian Mathematics, its highlights in forming Serbian Mathematics School in the 19th century, as well as great contribution of Mihajlo Petrovic Alas (1868–1943), the most significant of its members, for teaching Mathematics in high schools in Serbia. Further, on, within this chapter, the contents are analysed, concerning the history of some mathematical symbols and terms, developmental phases of the concept of numbers, their names and ways of noting them. Chapters, which follow, are about the counting tools (abacus and tables) and counting with the aid of them. The last sub-

chapter of this chapter refers to number systems, history of numeration from its existence to contemporary numeration the origin of the zero and its marking through history, as well as ways of noting big numbers. The reader will, in the way in which final subchapters are analysed, recognise interest of the author, his deep and thorough knowledge of those contents, which undoubtedly comes from his scientific and professional interests and realised results from this area.

The third chapter will provoke significant interest of wide scientific and professional public. The title *Mathematics and religion* points out its interdisciplinarity, as well as non-standard, and in scientific and professional works of Mathematicians rarely present contents. Being aware of these facts, the author opens a new chapter with the sentences in which he stresses that Mathematics and religion, although at first sight have nothing in common, are close, even interwoven in many segments; [...]." The chapter *Mathematics in Religion and Religion in Mathematics* starts by stressing similarities between Mathematics and Religion. It seems to us that these similarities have been successfully expressed through the role of intuition through sensing the truth and the need to approve this truth, both in Mathematics and Religion. Nevertheless the methods of approving are different. There is a parallel between dogmats, which are a part of dogma, who present the basis of religion and adopt it without checking, they are trusted, and the system of axioms, which have the same role in forming each of mathematical theories. The guarantee of the axiom truth is the man's mind and the guar-

antee of the truth of dogma is God. Various mathematical proofs about the existence of God and the fact that these tendencies are met in the work of mathematicians who created Mathematics through their work, witness the presence and justification of stressing the mentioned parallel. The author states the example of the genius Indian Mathematician Ramanujan (Srinivas Ramanujan), who stated at the beginning of the 20th century that in his dreams he received visions from Gods in the from of complex mathematical truths. In this way, he gave to Mathematics significant results, incomprehensible to the mind. The chapter finishes with reviews of the influence of religion to forming some mathematical terms, relation of churches towards Mathematics, presence of Mathematics in the Bible and review on the relation between Mathematics and religion. In the chapter *Influence of Religion on Development of the term Infinity,* the author gave the retrospective of development of the term infinity in Mathematics, which analogues in religion can be recognized in the terms infinity and immensity, which can be found in the Bible. The author sees many difficulties and challenges concerning introduction and using this term. In the book, the reader will face Aristotle's (Αριστοτελ

ηζ) problem of actual and potential infinity and Zenon's paradox and Euclidus's (Ευκλειδηζ) theorem about the infinity of the set of simple numbers and Cantor's Канторове (Georg Cantor) transfinite numbers and his statement that he is only the God's messenger and famous Kronecker's (Leopold Kronecker) statement that whole numbers were made by God, and everything else is made by man". The chap-

ter *Mystique of Numbers* in the first part leads the readers to Pythagorean school, in which numbers and their relations represent the essence of the real world, through their world of polygonal numbers and introduction of different classes of numbers, with the stressed mystic abilities, as well as the crisis they faced by the realization that the side and the diagonal of the square are not co-measurable. Certain knowledge about the mystique appearances and the role of Mathematics in oculistics will certainly attract readers. It is particularly seen in the titles of sub-chapters *Numbers determine human character, Destiny is in names* or *How to determine a fortunate city? Magic of Number 7…* Up to the final sub-chapter *Aritmology of Early Christian Scholars* that can briefly be characterized by the attitude of Nicomah I (Νικομαχ I), (1st century BC): "Everything in nature is determined or is in accordance with number, according to thoughts and mind of the one who created it". The chapter *Mathematicians Priests, Monarchs and Meolosts* is the result of many and various kinds of pursue of the author. The chapter starts with the review of life and mathematical contributions of about forty priests and theologians who come from the environ in which we can put Western civilization (Ancient Rome, Italy,

England, France, Germany, Spain…). We can see many famous names among them. We are going to state some of them, without any pretentions to estimate their contribution to Mathematics. Those were Roger Bacon, Bernhard Bolzano, Rudjer Boskovic, Bonaventura Cavalieri and Lucca Paciolli, Michael Stifel. M. Dejic included in his book the chapter *Orthodox Monarchs – Mathematicians* too. The life and work of the Russian Monarch from the 12th century Kirik Novogorodski was presented, as well as Byzantine Monarcchs from the 13th and 14th centuries Maxim Planuedes, Theodore Metohit and Argir, Serbian Monarch Lazar Hilandarac who lived between 14th and 15th century and I.M. Pevusin, Russian priest from the 19th century. The writer of this review was particularly impressed by the new "meeting" with the first, up to now preserved Russian manuscript of mathematical contents of Kirk Novogorodski (Кирик Новгородский), what he saw in the ancient Orthodox Monastery Veliki Novgrod. In the chapter *The First Mechanical Clock in Moscow, a piece of the Serb Lazar Hilandarac*, a short history of medieval mechanical clocks is given, as well as the historical situation in Byzantium and Russia of that time and the history of producing and technical characteristics of the clock which

the Monarch Lazar Hilandarac made in Kremlin in 1404. Undoubtedly, this represents a significant detail within the frames of cultural history of the Serbs. In the chapter, *The System of Measurement in the Bible,* there is a list of measures for length, volume, weight and money made, which were afterwards transferred into the contemporary measurement system. The author made some additional remarks concerning the efforts of he translators of the Bible into Serbian, to find suitable words, sometimes introducing new words, enriching lexical fund of Serbian. In the final chapter, *Calculating the Date of Celebrating Easter* the author thoroughly and widely shows historical thoughts concerning these issues, including efforts for the calendar reform and the role of the Serbian Orthodox Church within them and Milutin Milanković. Apart from stating table for date determination of Easter, the author instructs the reader how to directly determine the date of Easter in certain year.

We are convinsed that the reader of the book ***Number, Measure, Immeasurability, From Mathematics to Anthropology*** by Mirko Dejic, will enrich spiritual life by new knowledge and that the new contents will motivate him/her towards new challenges.

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