

# The Pre-eminence of Existence versus the Pre-eminence of Mathematics

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Scientists, as well as, philosophers, generally, make a clear distinction between mathematics and natural sciences – engineering sciences, economy, biology, etc. While natural sciences are constructed based on invoking the argument that experiment suits reality, according to the „*adaequatio rei et intellectus*”<sup>1</sup> formula, mathematics allow much more flexibility within the abstract world of mind. This characteristic, defining mathematics for chiliads, has begun to change once the computers appeared. These have changed the intellectual landscape, offering possibilities to explore realms entirely new, unimaginable, that, without the usage of such a "calculation power" would have had remained inaccessible to our mind. The price to pay for accessing these realms, because there is always a price, is that many of them can be known only through experiments.

Today’s computers promise access to bizarre worlds that, for the time being, remain just isolated intellectual achievements. Indeed, we notice a proliferation of heuristic techniques, of unproven results, of conjectures, opinions, etc. Computers have offered and offer more and more computational and conceptual resources in order to explain some of these phenomena, although in their essence have remained pure isolated curiosities without being systematically studied and explained.

All along this paper we stated that **doing science means doing mathematics**, and so much this opinion has stricken roots, so that in some fields we witness a genuine **pre-eminence of mathematics** upon the natural sciences. This attitude adopted by more and more scientists owes mainly to the superficiality and self-sufficiency which “stroke” the philosophy of the 20<sup>th</sup> century. Indeed, contemporary philosophers practice a *garrulous philosophy, a babbling, chatty philosophy*, giving up its fundamental content, as it has been defined from its very beginnings as “*Love of wisdom*” - *φιλία σοφίας*. This attitude of stressing, every now and then, only the mathematical formalism and abandoning the problem of discovering the fundamental causal mechanisms that govern motion within the segment of creation that interests us, has its origins in Pythagoras’ ideas. He was the one that became aware of the ubiquity of mathematical formulas in the Universe, considering mathematics as *the essence of a mystical, supernatural space that governs the reality surrounding us*. Later, Plato adopted the Pythagorean mysticism, his solution to the problem of the concepts, being the construction of a supernatural realm – “*The World of Forms*” – introduced in the *Timaeus* dialogue, in which one can find the perfect and eternal mathematical abstractions our concepts refer to. Metaphysically, the world of Forms was regarded as real, while the physical entities from our world were nothing else but shadows, imperfect copies of the Forms. Thus, genuine knowledge meant knowing the immaterial Forms and not the real imperfect world, which is continuously changing. Consequently, genuine knowledge in natural sciences means knowing the abstract Forms, which is to say the mathematical laws in a given field, and not the fundamental causes, specific to that field. The Platonism, strongly manifest even nowadays, *avoids the physical world in favor of a supernatural one, one with pure abstractions, in which a well-defined order exists*.

The second major version of the pre-eminence of the mathematics owes to those thinkers that accepted the Platonic ideas of an inherent passive and chaotic world, but rejected the existence of a supernatural world, a world that imposes order. Still this standpoint implies a world that stays chaotic – an unacceptable representation, since the fact that the world is

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<sup>1</sup> The strict meaning of „*adaequatio*” is “*correspondence*”. We should notice that this expression, launched by scholastics is nevertheless, a simplistic and limited way of seeing things. So, correspondence, agreement between intellect and reality, when referring to reality, may limit the reality. In other words, it is about identifying the man and the reality observed rationally or through senses, which is to say, the reality as we “comprehended” it.

ordered is obvious even for the most skeptical of the skeptics.

The dilemma of: *how could science explain settled order in a physical world, since science rejects the supernatural order* has been solved by Kant, the philosopher with the greatest influence upon the 20<sup>th</sup> Century scientists. His solution is: *We are the ones who put order into things. The perceptual knowledge is not a direct acquisition of the world that surrounds us, as it is, but its distortion – it consists of sensorial data that have been processed by our conceptual consciousness, data that was adapted to comply with certain inbred conceptual categories that keep our sensations in order.* This process that can not be, by any means, avoided, reassesses itself due to the fact that we do not perceive reality as it is, but rather as it appears to us, after we have processed it.

Influenced by Kant, scientists have given up the idea of understanding the real world, and its causal profoundness, as a pointless idea, since there will always be some part that will remain unrevealed. Therefore, we are left with the fact that the mathematical models only describe “*in a correct manner*” the appearances, that is to say our understanding of the physical world we live in.

We notice, at the first glance, the premises shared by Plato and Kant versions of the pre-eminence of mathematics. Both of them regard the material world of entities as not being real, so **something** from outside the material world must be responsible for the world order. Followers of Plato consider that this **something** belongs to the supernatural, while those of Kant believe that **it** resides within the conceptual categories, inside our mind. Both these beliefs consider that such **thing** is to be found in conscience. Therefore, the *pre-eminence of mathematics is reduced to the pre-eminence of conscience* – according to this idea, conscience imposes *identity* and *structure* to a world that would otherwise be chaotic<sup>2</sup>. The two concepts, nevertheless, don't agree upon the bearer of this conscience, the one that puts order into this world – God or Man.

Consequently, we notice that in the study of natural sciences, giving up the direct relation with the real physical world, in favour of mathematic formalism, comes directly from philosophy, under the authority of two of the most talented and inspired philosophers: Plato and Kant.

Still, there is another justification of the pre-eminence of mathematics upon the natural sciences, maybe the most direct and obvious one. It is the fact that, in most cases, if not always, “*reading the nature*”, representing it through mathematical symbols, is not accessible just to anyone. Not any person is able to “*discover*” the principles or laws that a phenomenon or process is based upon, inside a certain segment of the creation. Discovering these laws is a very fine intellectual process, which implies coordinating profoundly the natural realities with those conceptual categories inbred or achieved through sensations. Once the laws have been discovered and “*moulded*” into a mathematic formalism, they become accessible, like a public space, through that very mathematic formalism.

However, along with the emergence and the development of computers, it has been noticed that even the ideal world of Mathematical Formulae has fissures and weaknesses in its own nature.

*Transposing the mathematical models into computational has determined the return to addressing the real world directly, which is to say, adjusting in a criticizing manner, the outcome of the computational experiments with the observations.* Thus, the computational experiments put back into place the **pre-eminence of the existence**, re-stating the Galilean concept of identifying only with the actual existence, this identification being done through the Mathematical Formulae. In other words, causality does not depend on consciousness – may it be ours or God's. And this was

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<sup>2</sup> It is important to mention here the ideas of Roger Sperry, nominated in 1981 for Nobel Prize for psychology and medicine, who notices in several papers that *while in the traditional atomist or micro-determinism way of thinking everything in evolution is determined from “top to bottom” and states of the brain determine mental states, however we have to agree that mental states determine as well states of the brain.* In other words, *the interior phenomenon of consciousness is not the outcome but it causes the brain.*

Galileo's and Newton's essential contribution, both of them being very careful with introducing any hypothesis. The order, legality, regularity do not derive from a cosmic consciousness nor from a subjective form of thinking, which also would be generated by the human mind. *Causality is an inherent law of to be. To be means to be something, and being something means to act according to the nature of things.*

The science that makes possible this returning to the actual physical world of the senses is *informatics*. To this extend, informatics does not stand under any circumstances as a method of studying the physical substratum of information, communication and system or information theory, automatics in specific applications for vary fields, as it was stated, but is a *palpable manner of carrying out computational experiments, transposing mathematical concepts into computational ones, setting algorithms for these concepts and studying their complexity*. Scrutinizing it, *informatics is computational algebra*, which basically, is transforming a concept into an algorithm than transforming the latter into software. Obviously, defining the mathematical concept, elaborating the algorithm and elaborating the software that "*embodies*" the algorithm are totally separated activities, using different concepts and principles. Specific to informatics is elaborating the algorithm and transforming it into a piece of software. This is the real core of informatics, its content, which places it very close to mathematics.

The presentation above is an analysis of *the profundity of the spiritual world*, of our possibilities in understanding the world we live in. I do not think that we can talk about a pre-eminence of mathematics or about a pre-eminence of the existence. These are concepts in analyzing and comprehending the mysteries of the spiritual and material world that characterizes our existence. Both these concepts are important, defining the human being as persona and liberty. Persona, meaning connecting with the existence and being part of it, and liberty, meaning the infinite possibilities of transposing the existence into Mathematical Forms. Metaphysically, we are dominated by the pre-eminence of mathematics, the only one through which we can penetrate the mysteries of the existence.

The true scientist, for whom the intellectualism, as a doctrine stating that knowledge, partially or in its entirety, is attained through reasoning, and represents a way of living, always swings between the pre-eminence of the mathematics and that of the existence. Crossing over from one concept to the other is made possible by the computational experiments. They "*bring to life*" mathematical developments while defining new "*proprieties*" for the extant world. Fundamentally essential is passing from the extant world to mathematics and further, through computational experiment, back to the extant world. We should note that the computational experiment is also mathematics. Consequently, a certain conclusion naturally arises: *without mathematics, the human progress is not possible.*

Putting into effect this attitude of continuous swing between the physical world of senses and Plato's world of forms, traveling between the pre-eminence of existence and the one of mathematics, implies that the scientist should use three institutions: *the laboratory*, "*the world of phenomena*" and *the library*. Only the laboratory and the world of phenomena contain and operate with the instant memory. Only the library contains and treasures the collective memory. Due to the expansion of information, something we can not keep pace with, it is more than necessary to consult the library, the *infinite library*, in order to find the general framework that governs the operational paradigm. Here, in the library we find enclosed the rutted patterns of reality. The scientist's effort is toward wearing off and breaking these patterns, then replacing them with new archetypes that narrow down the boundaries of our ignorance. In other words, that would be, modifying library content, updating it. One thing is for sure, without library we can not live.

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