

# Moira and Eileithya for Genesis

*Alexey Burov, Lev Burov*

## The Problem of Mentality

While contemplating on first principles, Rene Descartes came to a necessity to separate all knowable into two parts, one of which encompasses all material and the other all mental. To him it seemed clear that to study these very different entities, *res extensa* and *res cogitans*, equally different approaches are required. At least in the early stages of their study, they should be considered as non-interacting, so that it would be possible to make any headway at all. Cartesian dualism represented, before anything else, a methodological principle, a boundary condition, stating the problem at first approximation as a necessary step of the beginning of cognition. This strict partition, taken as a rule by science, along with other principles, gave fruit that exceeded the boldest of expectations. However, behind the success of science there lays hidden a blind spot, inherited from birth: the connection between thought and matter. Although the presence of this blind spot is well known and attempts to overcome it have not stopped from the time of Descartes, such attempts so far turned out to be futile. If the two branches of being were totally alien to each other, how could they interact? If they have a common ground, how can that ground be understood?

The colossal success of natural sciences only accentuates this question. Could mentality be a consequence of matter? Could it have appeared in the process of evolution as entailment of the laws of nature and play of chance? Is such a hypothesis reasonable or does it contradict to some foremost principles? Mentality gives rise to thought, and the thought in question far exceeds the desiderata of life. In its ultimate aim, thought is cosmic, even super-cosmic, all-encompassing. Could thought, having come in its development to the comprehension of the laws of nature, turn out to be a consequence of these same laws?

In a sense, fallacies are more powerful than the truth. For each correct solution to a problem competes a myriad of possible errors and even more meaningless semblances of answers. That being so, how could it be chance generating thought, as a systematic motion to truth rather than away from it? And if not chance, can the laws of nature be such a guiding force? But, do they contain even a hint of assistance to their own comprehension? Does their formulation offer a way to even introduce the concept of *understanding*? It seems that such a possibility is excluded already at the first stage of the strict separation of *res cogitans* from the science of *res extensa*. If so, the birth and development of thought and comprehension of the laws already discovered by sheer power of chance seems utterly impossible. Usually, the counter-argument to these considerations comes from natural selection; motion toward truth is postulated to be favored by evolution through its assistance to survival and procreation. The idea states that evolutionary benefit can be so high that its factor becomes more powerful than the factor of weakness of solitary truth before the swarm of everything else. If we suppose that thought did

emerge purely by chance on the basis of life, then the growth of this faculty, as some suppose, can be understood as a scientific hypothesis, so the question of soundness of this hypothesis is raised. Therefore, let us enumerate everything that it requires to take on faith. First, we must accept the significance of the chance of self-effectuated birth of thought from non-thinking life. Second, we must accept that natural selection is so powerful that it is able to systematically sieve out the elusive truth. Third, we have to accept that even in those cases, when the fundamental cognition in no way benefits the improvement of life conditions—in fact, it often being the opposite—the motion forward is not prevented. These assumptions are quite far reaching, and natural selection demands all of them without any arguments or a possibility of a scientific check. Suppose that this significant and unearned credit is still granted. Can it still be not enough for a sensible acceptance of this idea?

Fundamental cognition not only puts forward the question of its possibility but also the problem of its value. It is hard and demands sacrifices of comforts and social successes available to a gifted person in other areas. Reason demands the answer to the question, What for? Is it satisfied with the usual answer of curiosity? Let us imagine a young man, choosing his path in life, who feels in himself this curiosity as a powerful pull that is worth many sacrifices. But then, if this young man takes on faith that all that is called *discovery* in the end is just chemistry of his brain, somehow limited by natural selection, then on what grounds, beside an unsubstantiated dogma of agreement of evolutionary selection with the motion to truth, can he believe this discovery to actually be discovery and not some hiccup in the atoms? Do the fantastical stories of savage tribes about the universe prevent these tribes from continuing their existence? Do errors about the early universe and elementary particles have any bearing on finding food and procreating? Should not this young man, having taken into account the aforementioned, conclude that the teaching about thought generated by laws and chance contains no solid grounds for faith in the credibility of thinking *per se*? Even an agreement of theory with observation does not change anything in this respect; if thought is only lead by the chemistry of the brain, then all these agreements are most likely illusory, carrying no relation to reality. The value of cognition demands a fundamental trust to cognition being genuine, but on what grounds can this young man entrust his life's effort to the laws of selection and chemistry of the brain? More so, as mentioned by last century's biologist, J.B.S. Haldane, admitting material processes as sources of thought leads to self-contradiction,

“If my mental processes are determined wholly by the motions of atoms in my brain I have no reason to suppose that my beliefs are true. They may be sound chemically, but that does not make them sound logically. And hence I have no reason for supposing my brain to be composed of atoms.” <sup>1</sup>

The value of cognition and one's worldview are interrelated, supporting or undermining each other. If the view of the world is such that thought becomes discredited in its pursuit of a worldview, in its claim to high truths, adequacy, meaning and significance of its striving, then such a worldview should be acknowledged as fallacious, and not at all because we would *like* it

to be one way or another, i.e. wishful thinking, but because it is self-refuting. Through its undermining of the value of cognition, such an idea discredits also itself [2.3.4](#).

The field of ethics, which answers the question about that which should be, is inseparable from metaphysics, which answers the question about that which is. When ethics is left out of consideration, the worldview becomes suspended in meaninglessness. It is said that a Cretan of antiquity, poet Epimenides, claimed that all Cretans are liars. While usually these words of Epimenides are considered a [logical self-refutation](#), we intend to consider them from a different perspective. Suppose that the Cretan asserted not that all Cretans lie every single time, but that their thoughts and expressions, forced by some inescapable doom, are always subjected to something extraneous, say, profit, wishful thinking, glorifying Crete, love of deceit or self-deceit, in other words, to anything but the truth. After hearing him out, one could not deduce anything about Cretans but could reasonably conclude that Epimenides himself is untrustworthy; he discredited himself. A known liar may every so often speak the truth, but there is no meaning in looking for it in his words. If Epimenides himself believed in the truth of his words, then the belief would become an act of *cognitive suicide*: one who believes in something like this devalues all that he can ever think. Remembering now Haldane's foregoing conclusion, it is hard not to notice that it reveals an *Epimenidic* structure of a belief in determination of thought by the dynamic of atoms. In either case, we have the one and the same cognitive suicide, which discredits thought in its core.

Someone may say that their personal love of truth is so strong that they can come to terms with the "atoms of the brain" and similar, unfriendly to this love ideas. What would this admission mean? Remember that here we are concerned with scientific knowledge on the cosmic scale. Would it not follow that this person equates the thirst for cosmic knowledge to some craving or fixation, whose meaning and reality behind it are unimportant to him? If we are, then, told that the adequacy of one's view is guaranteed by agreement of theory and experiment, the problem is still the same: how do we know what lies behind this agreement? Is it not a dream, Matrix, computer simulation, Boltzmann brain or the demon of Descartes [5](#)? And if such possibilities are admitted, won't our golden carriage turn into an ordinary pumpkin, with the appropriate consequences concerning the plans for our scientific adventures? Can we remain unconcerned whether we are really travelling in a royal coach, thoughtfully journaling our impressive voyage, or whether we are madly bouncing around on a pumpkin in the midst of other bedlamites? Descartes, tasking himself with the foundational principles of modern science and perceiving clearly this indispensable question, came to a conclusion of necessity of grounds for trust to thought as a condition of a pursuit of fundamental knowledge. I am prone to make mistakes, wrote Descartes, but principles underlying thought must not doom thinking entirely to delusion and dead ends. Every error should leave the thinker a possibility of correction. If not, it would mean that God Himself decided to deceive us, or that He doesn't care, leaving us in our pitiful situation of inescapable delusions and dead ends. Seeing himself in such a dramatic situation, Descartes saw only one solution: trust to God. God is not a deceiver, is the credo of Descartes, which lays the groundwork for faith in the high value of cognition, liberating from the crippling oppression by demons of the total metaphysical skepsis. God is not a deceiver, Descartes

repeated his saving formula, more often than any other thesis in relation to the Creator. Another great physicist, from a much closer time, Albert Einstein, found his own words for the same credo, "Subtle is the Lord, but malicious He is not." This tenet does not follow from science at all, on the contrary, it is the condition of a cognizant pursuit of science. One way or another, such great physicists of the XX century as Planck, Schrodinger, Bohr, Jeans, Heisenberg, Pauli, De Broglie and Eddington expressed the same faith in the irreducible sovereign status of thought. It is to emphasize this interdependence of science and faith, Einstein said that religion without science is blind and science without religion is lame.

Thus, the hypothesis of aleatory or mechanical emergence of thought from matter should be rejected, and not even due to the significant hurdles of its scientific weakness and unfalsifiability but because of its *Epimenidic* character, its entailment of cognitive suicide. What are the ideas that hide in the blind spot of the Cartesian dualism? We tried to show a category of ideas that cannot be right. Haldane's "atoms of the brain," the Matrix, world as a simulation, Boltzmann brain and total scepticism all contradict the very foundation of knowledge by annihilating its value. Not one of them can be rejected on the basis of scientific facts; they are all metaphysical [6](#) and scientifically unfalsifiable. The question of why these views are commonly assumed is left for the reader to ponder, but they can be rejected only by an act of free will, an unproven belief in the supreme nobility of the source of cognition, in that God does not deceive, that subtle is the Lord, but malicious he is not.

Thomas Nagel, while painting naturalism as "a heroic triumph of ideological theory over common sense," pins his hopes on panpsychism, where mentality does not emerge, but is rather intrinsic to nature, being at the same time responsible for its evolution and possibly even laws [4](#). However, were mentality but a part of nature, by what means could this part be responsible for the laws of the whole? In what way could it install and maintain them through the Big Bang and up to now? Nagel does not see that such a powerful and unshakable authority over nature implies the transcendence of this power.

Does this all mean that the One who created matter, the first to put thought into motion, determines at every step our motivations, values and goals, always pulling all our strings as though we were mere puppets? Or, do we have some freedom in establishing our goals and even in ennobling our values? In what way do the values of cognition and creativity, often being at odds with life's comforts and necessities, could have entered the world? The remainder of this text is devoted to that question.

## The Problem of Value

The laws of nature are expressed mathematically. More than just confirming this conviction of the founders of physics, the history of science does so 'unreasonably' well [7,8](#). Yet, what is

mathematics? To Galilei and Descartes, who believed in the mathematical core of nature, the answer seemed clear enough. By mathematics they understood a sort of reasoning exemplified by Euclid's geometry with its non-contradictory axioms and unambiguous theorems. Later, such structures became known as formal systems.

From the objective point of view, one formal system does not appear better or worse than any other; their content seems value-neutral. Our investigation, however, leads us to pierce deeper and reappraise this apparent neutrality: is it not an illusion of a superficial view? Far from always do values reveal themselves openly and directly; moreover, often their power is associated with a certain reticence, hiddenness or semi-hiddenness.

Were formal systems completely value-neutral, what could it be that pulls to them probing minds? Curiosity is an often suggested answer, but human curiosity has countless expressions. By what means can these purely speculative structures, devoid of feeling and passion, become especially prevalent in the mind of a curious person when viewed in comparison with other subjects, much more relevant to the emotional nature and pursuits of social success? Even if by some strange reason they still become interesting, what forces the mathematician to devote his life to a select few of them, forgetting countless others? Mathematicians, daring to answer such questions, speak of beauty.

"It may be very hard to define mathematical beauty, but that is just as true of beauty of any kind,"

wrote an eminent English mathematician of the last century, G.H. Hardy, in his *A Mathematician's Apology* [9](#). Mathematical beauty may not give easily to definitions, but it is exactly that which the mathematician seeks, only it being valuable,

"A mathematician, like a painter or a poet, is a maker of patterns. If his patterns are more permanent than theirs, it is because they are made with ideas... The mathematician's patterns, like the painter's or the poet's, must be beautiful; the ideas, like the colours or the words, must fit together in a harmonious way. Beauty is the first test: there is no permanent place in the world for ugly mathematics... What we do may be small, but it has a certain character of permanence..."

Notice that Hardy shows no doubt in beauty as the timeless value of mathematics; thousands and millions of years will pass, anything and everything else will change, but only beauty could save mathematics from being forgotten. It is the search for a specific beauty, beauty of the patterns in ideas, which begets mathematics, as he explains. One shouldn't think that this aesthetic view on mathematics is some eccentricity of Hardy; many leading mathematicians expressed the same thought, one way or another, and it seems none denied it.

Noting the impossibility of defining beauty, Hardy tried not to miss anything that can be said about the mathematical kind. Speaking of the beauty of the "Euclid's" and "Pythagoras' " theorems, he points out a quality that can be called their dramatic tension,

"In both theorems (and in the theorems, of course, I include the proofs) there is a very high degree of unexpectedness, combined with inevitability and economy."

More than to anything else, though, his attention turns to an aspect of the mathematical beauty which he terms *seriousness*,

"The beauty of a mathematical theorem depends a great deal on its seriousness... The 'seriousness' of a mathematical theorem lies, not in its practical consequences, which are usually negligible, but in the significance of the mathematical ideas which it connects. We may say, roughly, that a mathematical idea is 'significant' if it can be connected, in a natural and illuminating way, with a large complex of other mathematical ideas. Thus a serious mathematical theorem, a theorem which connects significant ideas, is likely to lead to important advances in mathematics itself and even in other sciences."

To some, mathematics may appear to be no more than a set of unconnected formal constructions, having in common only the requirements of formality but not of content. It is not that such a view is completely false, but that the beauty of the *serious* mathematical ideas evinces the superficial character of such a view, revealing instead a deep unity of mathematics. Here is how another eminent mathematician and a historian of mathematics, Jean Dieudonne, a long-term speaker for the Bourbaki group, wrote about it in the last years of his long life ,

"...for certain problems which can be stated in perfectly elementary terms, especially imaginative mathematicians have managed to obtain partial or complete solutions by bringing in concepts or techniques drawn from analysis which seem to have nothing to do with the question in hand. I can hardly do more than allude to these methods, which amaze mathematicians, making them feel the profound and often mysterious unity of mathematics, and in speaking of which they do not hesitate to use the term 'beauty'." [10](#)

Let us ask ourselves, By what power does this discovery of a theorem's *seriousness* affect mathematicians so? Why is it that any hint of this unity turns out to be vitally important, being perceived as something amazing? In his search, is not the mathematician moved by a desire to glimpse behind particularity and multiplicity into this mystic unity, a power supreme and inexpressible, the amazing and all-good source of Being? Is this not the same aspiration that drives physics towards the nearly mythical Theory of Everything? It appears to be not a coincidence that the greatest mathematicians and physicists of the past were predominantly mystics [11,12](#). One of them, Erwin Schrodinger, wrote [11](#),

"It seems plain and self-evident, yet it needs to be said: the isolated knowledge obtained by a group of specialists in a narrow field has in itself no value whatsoever, but only in its synthesis with all the rest of knowledge and only inasmuch as it really contributes in this synthesis toward answering the demand, 'Who are we?' "

It is worth noting that even someone calling himself an 'atheist' can nonetheless be considered a mystic, as, for example, Hardy, who contemplated and described the eternal beauty of the Platonic world of mathematics,

"I believe that mathematical reality lies outside us, that our function is to discover or observe it, and that the theorems which we prove, and which we describe grandiloquently as our 'creations', are simply our notes of our observations. This view has been held, in one form or another, by many philosophers of high reputation from Plato onwards, and I shall use the language which is natural to a man who holds it."

Whence came all the energy of Hardy's anti-Christianity? Might it be evoked precisely by a religious zealotry of his Platonic mysticism, an intolerable collision with another variety of religious experience?

Let us, however, leave aside this personal question and ponder a general one, to which our research has been leading so far. Could the experience of mathematical beauty be nothing but a psychological specific of a certain type of people, a specific that just happened to be quite beneficial to cognition? Wouldn't the mathematical beauty appear in this light more of a property of some psychological state, culture or biology than mathematics by itself? Is it possible to definitively resolve this question? Keeping in mind impropriety of proofs in the questions of beauty, let's try to examine some reasonable -- even if not given to proof -- arguments. To begin, let us keep in mind the intention, giving way to this special form of thinking: *in its idea*, mathematics is *entirely* detached from all that is specific to humanity and even to nature. It is a composition of pure, abstract, timeless reason, reason *per se*. In this strict, even defiant disengagement, entities like complex numbers or non-Euclidean geometry were discovered and studied. To admit that the beauty of even these objects, so scrupulously cleaned of *anything* specifically human and natural is still specifically human or natural, would force us to conclude of impossibility of human thought ever escaping the bounds of psychology and biology of the genus *Homo*, even if sometimes *sapiens*. Such an admission would imply a futility of any daring project to explore reason in itself and the illusory nature of all, even the most impressive successes of that adventure. For those who would accept such a defeat, mathematics would lose its independent interest, remaining, at best, just another tool. Great mathematical discoveries never happened with a utilitarian goal. Only those moved mathematics ahead who loved it not for some other aim, however good and important, but for its own sake, for its eternal, super-human beauty. Listen to one more great mathematician and philosopher, Bertrand Russell,

Mathematics, rightly viewed, possesses not only truth, but supreme beauty cold and austere, like that of sculpture, without appeal to any part of our weaker nature, without the gorgeous trappings of painting or music, yet sublimely pure, and capable of a stern perfection such as only the greatest art can show. The true spirit of delight, the exaltation, the sense of being more than Man, which is the touchstone of the highest excellence, is to be found in mathematics as surely as in poetry. (The Study of Mathematics, 1903)

Russell stresses the specific value of mathematics in question: being strictly and even coldly detached from “our weaker nature”, it inspires by its “stern perfection”, gifting the acute feeling of “being more than Man.” This unique, super-human aesthetic—the source of mathematical inspiration—is what he describes. By denying to mathematics the truth of this belief one closes the door to mathematics; it reveals itself only to those who share in this faith, inseparable from reverence for mathematics. Thus, faith in the trans-humanity of mathematics is inseparable from mathematics itself. To value mathematics while denying this faith is to contradict oneself.

The above citation from Russell is interesting as a witness of a renowned mathematician and a subtle philosopher, but it has one more notable quality. This is the statement that Eugene Wigner made the epigraph to the second edition of his article, *The Unreasonable Effectiveness of Mathematics in the Natural Sciences* (1960), the first edition featuring a more reserved,

“and it is probable that there is some secret here which remains to be discovered.”  
(C.S. Peirce)

In the subsequent editions, Wigner exchanged this discreetly enigmatic epigraph to one of the most triumphant and profound hymns to the mathematical beauty, quoted above. In this article, Wigner, who in 1963 received the Nobel prize for the revolutionary work in symmetry and application of the Group Theory to Quantum Physics, focuses attention on a different, complementary to the above discussed aspect of mathematical beauty. Namely, Wigner demonstrates the astounding effectiveness of mathematics in physics.

Some authors understand Wigner’s fascination as a delusion, a naive astonishment before a simple fact that the laws of nature, whatever they are, can be expressed by the means of measurement. For example, a historian of mathematics Grattan-Guinness <sup>13</sup> sees nothing especially astonishing or unreasonable here; mathematics was made just in such a way that one can put a number to anything, and since physics itself translates data into numbers, mathematics naturally becomes effective; what you put in is what you get. However, the one who is deluded here is not a founder of quantum physics but the eminent historian of mathematics. His delusion results from ignoring that the laws of nature are not expressed by just any kind of formulas but by very special ones.

First, the laws are endowed with a peculiar mathematical beauty, uniting in themselves formal simplicity, richness of solutions and one or another kind of symmetry, often as if suggesting itself as a hypothesis to a mind gifted with intuition. This special beauty is sometimes called *elegance* of the laws of nature. Thus, elegance has a decisive significance to a birth of a hypothesis, the most mysterious part of discovery. Secondly, the same elegant mathematical law captures a tremendous range of parameters (distances, energies, etc.), at that with a fantastic precision, up to twelve digits <sup>16</sup>. This quality of the laws can be called *universality*. Finally, the laws happen to be friendly to life’s appearing and developing up to intellect; following the established terminology, this quality can be called *anthropic* <sup>14,15</sup>. The combined presence of these three qualities allowed for their discovery by great minds, and for that reason, it seems that the most

appropriate term, uniting all three, is *discoverability*. A universe whose laws satisfy the *Discoverability Principle* of being *elegant, universal and anthropic* we suggested to call *Pythagorean* <sup>8</sup>. It could be even that the laws of our universe constitute the simplest possible set, compatible with the DP. The only so far available explanation of this amazing quality of the laws is that they come from the highest mind that created our universe able to not only be inhabited by intelligent beings but cosmically cognized by them.

Roger Penrose created a brilliant graphic of paradoxically connected *Three Worlds, Three Mysteries*, which shows Being as consisting of the Platonic world of forms, as well as the physical and the mental worlds <sup>17</sup>. Karl Popper authored his own triad, the material, individual and the cultural worlds <sup>18</sup>. Consolidating the worlds of Penrose with the worlds of Popper, it seems reasonable to understand the mental world of Penrose as a unity of individual and collective, generating the new and cultivating the established. We will not try to judge here whether anything else besides mathematics partakes in the Platonic world of forms; it is not that relevant for this essay. What is important is that mathematics is present significantly in each of the worlds. The mathematical ideas that are beautiful are *intrinsically aristocratic* in the Platonic world; they are from The Book <sup>19</sup>. This beauty inspires those who are sensitive to its call, tuning their minds to searching out her new manifestations and to relaying the precious experience to students. In this way, mathematics enters both halves that constitute the mental world. Finally, the discoverable mathematical forms enter into the physical world as its fundamental laws, enabling the cosmic cognition with dramatic flair and tension. In this way, mathematics connects the three worlds and mysteries into one, becoming their universal link, a thread that runs through them all, whose significance is inseparable and unthinkable outside of its beauty. Extending Hardy's concept of a theorem's seriousness, this deep every-worldness of mathematics could be seen as *metaphysical* seriousness of mathematics itself.

To see in mathematics nothing but a collection of all possible, value-neutral, formal systems <sup>20</sup> is no better than to view the art of sculpture as a collection of all possible articles made of stone, or defining man, according to the old anecdote, as a two-legged creature without feathers. As we cannot conclude from "stoneness" about the essence of a sculpture, so from the formality of mathematics, its *mere material*, one cannot deduce its ontological essence or espy that essentially it is the universal beauty of all worlds. It is with the power of beauty that the existing is connected with that which is only being summoned into existence: Being with intention and goal. The world was created for its beauty, and man—as one who may hear that and respond. Necessity can be stated in clear and distinctive laws, but beauty breathes freedom and so slips the nets of reason. That is why a belief that we are marionettes, even in the God's hands, is incompatible with inspiration for a worthy response. Eternal beauty calls to new manifestations; by evincing the contemplation of itself, it beckons birth, never promising but sometimes giving hope, always deciding the fate. In this way the wise Diotima taught Socrates <sup>21</sup>, "Μοῖρα οὖν καὶ Εἰλείθυια ἢ Καλλονὴ ἐστὶ τῆ γενέσει."

"Beauty is the Moira and Eileithyia for birth."

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