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Announcement: Value of Fundamental Science

by alexeyburov

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Value of Fundamental Science



Fundamental science is a long-term adventure which has required high devotion and social support, especially significant in the epoch of big laboratories. The measure of this devotion and this support expresses the value of the fundamental science in society. Why does the fundamental science have a value, what determines its strength and what endangers that? The dominant answer: The value of science is caused by the curiosity and is expressed by the technological progress. Is this a good answer?

Alexey Burov FERMILAB

Question

- Fundamental/Theoretical science is a hard long-term human adventure which has required high devotion and social support, especially significant in the epoch of *Mega-science*.
- The **measure of this devotion and this support** expresses the real value of the fundamental science in public opinion.
- Why does the fundamental science have a value, what determines its strength, and **what endangers it**?
- The dominant answer: The value of science is caused by the curiosity and is expressed by the technological progress.
- Is this really a good answer?

Historical Reminder

- FS has its home. Mathematics was born and highly developed in the ancient Greek-Roman civilization, by Pythagorean and Platonic schools [see e.g. my talks, also K. Ferguson, “The Music of Pythagoras”]. Proto-Physics was born there as well. Ancient FS was a part of Platonism—the teaching, which included metaphysics, logic, ethics, epistemology and soteriology. All known ancient mathematicians were strongly related to Platonic groups.
- The catastrophe of massive barbarian migration in the West and totalitarian degradation in the East of Roman Empire almost erased FS in the Mediterranean. It was partly preserved inside the church walls, expanding through monastery and cathedral schools and church-organized universities. A great role was also played by transfer of FS into islamic world (enhanced by massive migration of educated Byzantine heretics), and its flourishing there during the Golden Age of Islam (VIII-XIII c.) Platonism and Aristotelianism were dominating philosophies both in the Christian and Islamic worlds.

Historical Reminder

- FS was significantly boosted at the Western civilization since XVI and especially XVIIc.
- Dissemination of FS to the outside world happened only as a result of strong westernization (Russia and Japan of XIX c.).
- The tree of FS never grows on the foreign soil, except it goes outside with its own soil: Universities, freedom of thought, travel, communications, enterprise, rule of law, etc. This transfer always meets a strong resistance of the receiving culture, so the transfer either goes hard and slow, or not at all.
- Maybe, this just shows that FS requires human rights as its condition, and the curiosity is indeed its direct motivation?

Technological Benefits

- The very idea that FS has its **main value** in the byproducts implies that its own value is insignificant by itself.
- Thus, this idea implicitly **devalues intrinsic value of FS; it is hostile to it.**
- Pragmatically, this idea is looking less and less convincing: do we really need to spend money for research at the levels of **10^{-20} m or 10^{25} m** to make our life better at the human scale? Is it true that this is the **most efficient** way to get new technology? Maybe, it was in the past, but is it still true now? The idea is looking more and more **dubious, if not absurd.**
- **May the value of FS be grounded in pure curiosity then?**

Curiosity

- **Curiosity is a general** feature of human beings, independent of cultures and civilizations.
- We can be curious in an infinite number of things. We as individuals and as societies are always making a choice to direct our curiosity to something and neglect other options. **Why and what for** would we be curious specifically about FS?
- In other words, why is FS more valuable, at certain aspect, than something else? **The very existence of the curiosity does not answer this question.**
- What makes a **mystery of the universe** so attractive? What is implied by this very idiom “a mystery of the universe”? And what is implicitly refuted by it?

“Mysterious” Universe

- The word *mystery* is by no means a synonym to *secret* or *unknown*. Contrary to those two, *mystery is strongly religious* in its origin and intense usage through millennia. It is associated with such words as awe, thrill, miracle, sublime, lofty, sacraments, divinity, presence of divinity... Ineffable, inspirational, magnetizing and appealing to response.
- *Mystery is inspirational*, while *secret* and *unknown*—normally not. *Secret* assumes *interest*, but has nothing to do with all the implications of *mystery*. *Unknown is neutral*, generally not assuming even any interest.
- Presenting FS as a response to the *mysteries of the universe*, many of us are *unreflectively* affirming the value of FS by means of a quietly ‘borrowed’ shining religious word.
- Maybe it is still ok to ‘borrow’ religious words in that manner? We’ll see.

Where mystery is lost

- While FS is the most universal knowledge, its value is peculiar to a civilization, to a **worldview**. Born in the ancient Greece, the tree of FS was reborn and still grows mostly on the Western soil, gradually going outside by a degree of westernization only.
- A key **worldview question** is about the **source of the universe**. What ideas about that are **incompatible** with the perception of the universe as *mysterious*, with value of FS?
 - **Gnosticism**: The world was created by a flawed or evil demon;
 - **Chaosogenesis** (CG): There is no divinity at all; the world is nothing but a bubble of primordial chaos. Bubbles with all possible laws of nature are appearing and disappearing in this meaningless soup (Weak anthropic principle plus full-blown multiverse).
- Chaos is the absolute minimum of good, an absolute evil. So, an absolute evil is proclaimed as a source of 'mystery'. How is it possible that CG is suggested by leading cosmologists? Is it sane?

Svidrigailov and Raskolnikov

“I don’t believe in a future life,” said Raskolnikov.

Svidrigailov sat lost in thought.

“And what if there are only spiders there, or something of that sort,” he said suddenly.

“He is a madman,” thought Raskolnikov.

“We always imagine eternity as something beyond our conception, something so vast! But why must it be vast? Instead of all that, what if it’s one little room, like a bath house in the country, black and grimy and spiders in every corner, and that’s all eternity is? I sometimes fancy it like that.”

“Can it be you can imagine nothing juster and more comforting than that?” Raskolnikov cried, with a feeling of **anguish**.

“Juster? And how can we tell, perhaps that is just, and do you know it’s what I would certainly have made it,” answered Svidrigailov, with a vague smile.

This horrible answer sent a cold chill through Raskolnikov. Svidrigailov raised his head, looked at him, and suddenly began laughing.

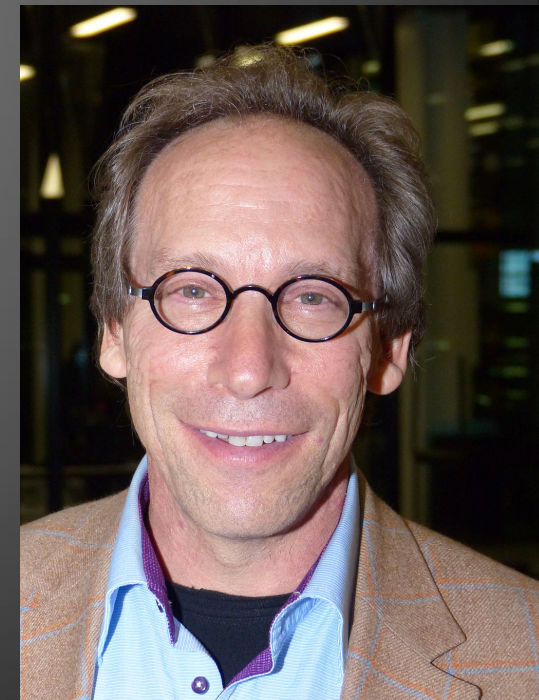
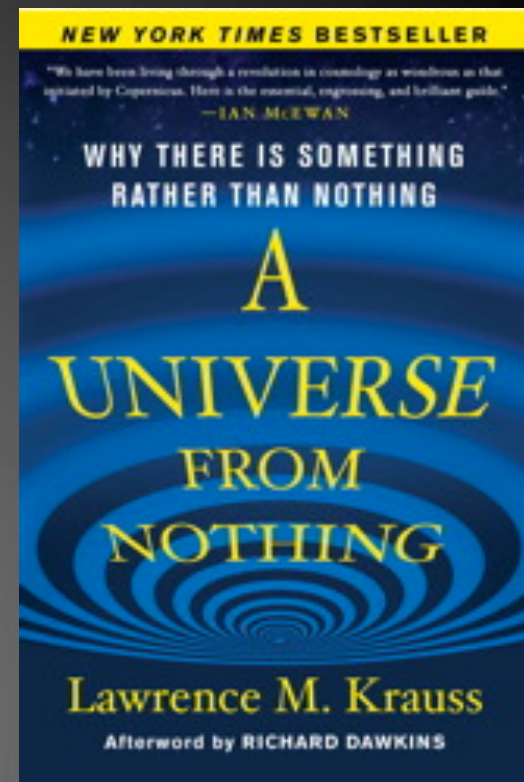


F.M. Dostoevsky
1821-1881

Dostoevsky, “Crime and Punishment” (1866)

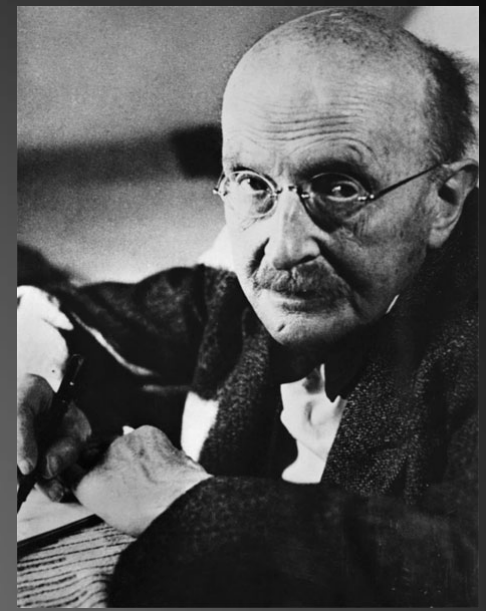
Chaosogenesis

- Isn't a dirty room full of spiders a lot more mysterious and sublime than nothingness? Isn't CG the most repulsive idea about the source of the universe?
- “What if it is still true?” might somebody ask. The issue though is outside the domain of science. What is the criterium of truth then? Consequences of this belief are all deadly. Shouldn't we judge about the tree by its fruits?
- Any doctrine devaluating the source of the universe, if taken seriously, is a killer of the “mystery”. No surprise that the teaching which gave birth and nurtured FS through millennia told about that source as the Absolute Good.



Pythagorean Faith

In the “Faith of the Fundamental Science”, this faith has been presented in the words of many fathers of science. Here, I am restricting myself by one of them, **Max Planck (1858-1947)**:



“We must assume behind these natural forces the existence of a conscious and intelligent mind. This mind is the matrix of all matter.” (1944)

“Both religion and science need for their activities the belief in God”

“ It is the historical fact that the very greatest natural scientists of all times—men such as Kepler, Newton, Leibniz—were permeated by a most profound religious attitude.”

“Religion and natural science are fighting a joint battle in an incessant, never relaxing crusade against skepticism and against dogmatism, against disbelief and against superstition, and the rallying cry in this crusade has always been, and always will be: On to God! ” (1937)

Pythagorean Inspiration

- Inspiration cannot be imposed on a free will. It can only be seen, felt, as something given by or coming from contemplation.
- Thus, inspirational ethics is evoked by ontology as its glow. The Pythagorean ethics sees FS as a communion with the Author of Everything, Who is both the Supreme Mind and our Heavenly Father.
- “And God saw that it was good”, “God created mankind in his own image and similarity, in the image of God he created them”—are powerful inspirational statements. Cosmism of Bible (Genesis, The Book of Job, some Psalms) complemented and enhanced the ancient Pythagorean Cosmism.

Cognitive Dissonance (CD)

- Somebody may still believe in the chaosogenesis, and be inspired towards FS. In this case the inspiration is coming from something else, in spite of CG, hostile to the value of FS. This is a case of a *cognitive dissonance*.
- “Cognitive dissonance is experienced by an individual who holds two or more contradictory beliefs, ideas, or values at the same time”.
- CD *results in diminished and unstable values*, personality split, inner conflicts. To overcome it, the contradiction has to be clearly seen and resolved.
- CG is just a manifestation of a broad CD generated by FS itself: the deep conflict between its *Pythagorean vital root*, providing its value, from one side, and its *deadly shadow, scientism*, devaluating all values, from another side.
- How did this CD happen?

Science and Philosophy

- **Scientific fact is reproducible**, independent of a specific observer, statistically confirmed. On the contrary, new **thought** coming in my mind is unique and **seen only by myself**. Thus, *thought per se* is excluded from scientific observations and conceptualizations. **Thought is scientifically unobservable and cannot be defined in scientific terms.**
- Thus, **scientific thinking cannot think about itself as such**: about its fundamental implications, general borders of possibilities, values, relations with philosophy, art, religion, etc. All these issues have nothing to do with universal **measurements**; instead, they require such individuality-related ability as **understanding**. In other words, **scientific thinking is unreflective by its very essence**. Even the question “What do I know?” is not scientific, since “I” is outside of the domain of science.
- This shows the **cardinal borderline** between philosophy, with reflection in its core, and science, unreflective by its very essence.

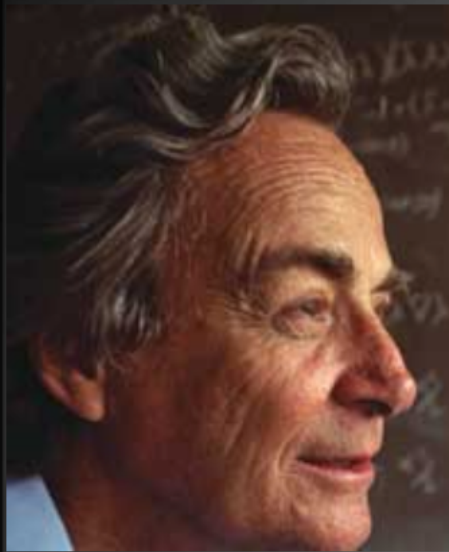
Scientism, the shadow of science

- Since Enlightenment, the **growing science** required more and more time for professional education and work in its sphere. As a result, **alienation** between science and philosophy was increasing more and more, until they mostly **lost each other after WWII**.
- Thus the growing weight and influence of science lead to **scientism**: an absolutization of unreflective, objective thinking. Scientism embraced not only many scientists, but the Western society at large, including some part of the professional philosophers. The rest of philosophers were preserved from scientism mostly because they had no idea what FS is about (Sokal hoax).
- Scientism is an extension of the reductionist scientific thinking to life and thought itself: thus, life is reduced to physics, and thought is reduced to life. The only difference between all of them is complexity.

Deadly shadow of science

- Ethical consequence is **nihilism**: **all values are devaluated**, since there are no right or wrong values for science. All of them are nothing more than chemical/ biological/ social mechanisms that just happened to be. You may appreciate certain things, but they are devaluated as ontologically meaningless.
- Less radical branches of scientism looked at Categorical Imperative and Golden Rule as ancient and ridiculous stuff which has to give way to such **natural** things as unrestricted will to power, where the fittest survive and win (**social-darwinism**), or to be substituted by the 'will of history' and 'laws of history', which are immoral per se (**scientific communism**).
- Two monstrous totalitarian systems of XX c. are fruits of scientism (see e.g. F. Hayek, "Road to Serfdom", "Counter-revolution of science: the abuse of reason").
- When everything is meaningless, the FS is meaningless too.
- For a victory of 'the naturally fittest' or of 'the vanguard of progressive humanity', FS could be supported only as a source of the super-weapon.
- Thus, in any of its revelations, scientism, a shadow of science, is a deadly enemy of science itself and all spiritual values at large. Scientism reveals itself as a fatal cognitive dissonance of the Western Civilization and the entire humanity.

R. Feynman on the “central problem of our time”



R. Feynman
1918-1988

Turning to the third aspect of religion—the inspirational aspect—brings me to the central question that I would like to present to this imaginary panel. The source of inspiration today—for strength and for comfort—in any religion is very closely knit with the metaphysical aspect; that is, the inspiration comes from working for God, for obeying his will, feeling one with God. Emotional ties to the moral code—based in this manner—begin to be severely weakened when doubt, even a small amount of doubt, is expressed as to the existence of God; so when the belief in God becomes uncertain, this particular method of obtaining inspiration fails. **I don't know the answer to this central problem**—the problem of maintaining the real value of religion, as a source of strength and of courage to most men, while, at the same time, not requiring an absolute faith in the metaphysical aspects.

Western civilization, it seems to me, stands by two great heritages. One is the scientific spirit of adventure—the adventure into the unknown, an unknown which must be recognized as being unknown in order to be explored; the demand that the **unanswerable mysteries of the universe** remain unanswered; the attitude that all is uncertain; to summarize it—the humility of the intellect. The other great heritage is Christian ethics—the basis of action on love, the brotherhood of all men, the value of the individual—the humility of the spirit... How can we draw inspiration to support these two pillars of Western civilization so that they may stand together in full vigor, mutually unafraid? **Is this not the central problem of our time?** (“The Pleasure of Finding Things Out”)

Scientism Today

- Nazism and Scientific Communism showed that **application of scientific approach** to mankind can lead to **civilizational catastrophes**. Apparently, this stopped encouraging **scientific utopias** of a '*bright future*'—at least, for some time.
- However, **scientism is powerful** in scientific communities and in society at large.
- Scientists though are the last who feel the demoralizing shadow of scientism, since:
 - This **spirit is natural** for them;
 - **Science has a strong immunity** against that: high motivation for truth, high competition.
- Science still suffers from scientism in various ways:
- Many scientists exist within the CD between the believe in high value of science and scientistic '**everything is meaningless**'.
- A demoralizing, deadly scientistic worldview acts against the inspirational root of FS, endangering its existence through a loss of public support.

Why scientism is wrong

- Scientism is wrong in many aspects.
- It is **venomous ethically**: demoralizing and devaluating all values.
- As directed against the values of science, **it is a suicide of scientific cognition**.
- Talking both about **wonderful mysteries of the Universe** and about **chaos** as its possible ultimate source, **in what case do we lie?**
- **Why should the public support science**, if from the face of science it is claimed that people are nothing but accidental machines and our world is nothing but a tiny piece of accidental mold inside an infinite pile of nonsense?
- **It is deadly socially, as the ground of totalitarian utopias**.
- It is also **wrong logically**. Scientism tries to deduce everything from a certain set of laws, a **theory of everything**, negating possibilities for miracles. It does not see, that ***miracles are more fundamental than the most fundamental laws***.
- The very existence of the world with its laws, both anthropic and discoverable for the growing thinking beings, is a miracle—a miracle maternal to these laws.
- Creative thought, maternal to FS, is another miracle, which cannot even be described in terms of observables and scientific concepts.

How to get out of scientism?

- Scientism is a loss of ability to reflective thinking, the loss of philosophy.
- Philosophy was eclipsed by an explosive growth of objective thinking, science. Although it happened fatally, everyone is free to overcome it.
- Until we get back to philosophy, at least to the classical Western Philosophy, our reflective thinking is going to be more naive and poor than even that of the prehistoric tribes. It is not only the future of FS which is at stake.

“Thinking begins only when we have come to know that reason, glorified for centuries, is the most stiff-necked adversary of thought.”

*M. Heidegger (1889-1976),
“The word of Nietzsche: “God Is Dead”” (1943)*



Thank You!

Pythagorean Faith