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**ON SCIENCE AND BEYOND**

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This is a collection of a few generalities and conjectures that mostly concern the nature of mathematics and its place in science.

**Кутателадзе С. С.**

О НАУКЕ И ОКОЛО

Собраны некоторые общие установки и гипотезы, в основном касающиеся природы математики и ее места в науке.

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## ON SCIENCE AND BEYOND

- “All men by nature desire to know.” This is the first sentence of *Metaphysics* by Aristotle.
- Science reminds of the Tower of Babel.
- Science is the art of expressing the complex in simple words.
- Mathematics studies the forms of reasoning, quantitative as well as qualitative.
- Mathematics is the science of the infinitude of abilities of *Homo finitus*.
- Mathematics is mostly a humanitarian science or, in other words, an unnatural science. The definitive particularity of mathematics is the desire of complete elimination of anything human.
- Mathematics is not a divine gift. Mathematics is a human enterprise, challenge, and endeavor.
- Farfetched is any comparison between mathematics and physics or linguistics.
- Science had ceased to be mathematics ages ago, but still carries the genome of *mathesis universalis*.
- Science is “supersensible,” implying that its content cannot be wholly revealed without man.
- Nature will remain after the extinction of mankind. However, but for ever will be the “supersensible” human culture that lies beyond material objects or is implanted in them by man. This is how science will disappear, demonstrating its anthropogenic—human—origin.
- Leadership and command have different functions in science. The leader paves ways, and the boss is needed for justice. No leader must be just, and nobody needs an unjust boss. Situation is much more intricate beyond science. The boss must take final decisions, like Korolëv who endorsed the resolution: “The Moon is firm.”
- Science is not a trade but a service.
- Science serves truth rather than justice.
- There is a chasm of estrangement between science and power. Power confronts freedom which is the essence of mathematics and entire science.
- The renegades of science lick the vertical of power.
- Mediocrity hates talent deeply and passionately, while lavishing all kinds of hindrance and obstacle to erect.
- The academic community nurtures its own undertakers, considering mediocrity harmless.
- Shame goes to the academic community that relinquishes the freedom of self-control.

- Each scientist carries his own source of degradation of science.
- Self-assurance, myopia, and senility are symptoms of academic provincialism.
- The ideal academic community consists of the scientists by belief, i.e., the persons who consider the principles of science as imperatives.
- Science enrolls common persons, each of which turns into a scientist by belief from time to time. These short epiphanies are the crux, essence, and value of life in science.
- Schools and only schools make the people of science into scientists by belief.
- The academic community is alive while there is a developing science. Since quite a few can change science, the power of the academic community is other than zero.
- Great science tends to vanish and never resurrect in the history of particular nations. Ancient Greece and Nazi Germany exhibited notorious examples. If we fail to preserve science in Russia now, it would possibly vanish for ever.
- Science is propelled by inevitable theories and inevitable problems. The great scientists propounded not only inevitable theories and addressed not only inevitable problems. However, only inevitable theories and inevitable problems had made these scientists great.
- What problems are more important—solved or unsolved? This is an example of an ostensibly intelligent question that is incorrect to some extent. Search of an answer seems to belong to philosophy. However, we—the scientists of the chalk and computer—are not adverse to the love of wisdom. The above question might be a reason for stopping and looking from aside at one's own life and work. Reflection is a philosopher's bread which is edible to us, the common persons of utilitarian specifics.
- We know theorems of a genius whereas there are no evil theorems. However, ingenious theories and experiments coexist in the history of mankind with misanthropic theories and vivisection. Science alienates villainy. Evil is the stigma of pseudoscience.
- Science serves. Pseudoscience dissolves.
- Pseudoscience is more attractive than science. Precaution must be exercised.
- Science dislikes subjectivity and vanity from the times of Ecclesiastes. Far from haphazard is the idea of a scientist in an ebony tower.
- Sexism pertains to personal inclinations. It is not a grammatical issue.
- Service to science posed to man a highly intractable problem of destroying his subjectivity. The subject destroying his own subjectivity is the image that might inspire the Rhodes sculptors of Laokoön.
- Man is gifted and lazy to the utmost degree.
- Talent lives in every body; genius, in a few.
- Lenity is the mother of mediocrity. Banality is the produce of mediocrity.
- Every professor likes knowledge. The old professor prefers old knowledge; and the young professor, new knowledge. This leads to disharmony in education.
- The researcher esteems novelty. The naturalist adores discoveries. The employee of science respects publication, and the scientist likes that which makes him wiser.
- *Homo vulgaris*, a biological man, does not change in the sense that he never transfers the acquired traits to his descendants. *Homo vulgaris* is rather modest and simple.

- *Homo socialis*, a social man, transfers his skills and knowledge. *Homo socialis* is selfless and optimistic.
- *Homo vulgaris* is mortal. *Homo socialis* is not eternal, but capable of resurrection and immortality.
- Ego is the measure of *Homo vulgaris*. The measure of *Homo socialis* is personality.
- Leo Tolstoy's formula:

$$\text{Man} \sim \frac{\text{Personality}}{\text{Ego}}$$

- Personality is broader than professionalism.
- Grandeur is not an indulgence.
- *De mortuis aut bene, aut nihil*. This mismatches the immortal.
- Shakespeare was a dramatist, and science is not a superstition. This is worthy to observe while reading Leo Tolstoy.
- Superficiality and thoughtlessness are extenuating circumstances for fools rather than geniuses.
- Great men made quite a few mistakes, but it is indecent to put buffoon's caps on them.
- Religion, the ancient psychotherapy, is created by man for himself and oriented to himself, alleviating him from the burdens of the real world and promising regeneration or immortality after death. It is the Lord or ancestors rather than man who occupy the center of religion.
- Science is created by man for future generations. It enables man to overcome his biological limits and to acquire immortality in descendants. Man is the source and aim of science.
- Religion is an idol of *Homo vulgaris*. Science is a tool of *Homo socialis*.
- Religion is confessed and professed. Science is studied, developed, and improved.
- Religion orders. Science teaches.
- Religion serves to man; and science, to mankind.
- Religion separates. Knowledge unites.
- Religion bases on belief rather than facts and logic. Science bases on facts and logic rather than belief. It is not unusual that a man of science and a man of religion agree with the first statement and quarrel about the second. The believer says that the disbeliever does not understand the impossibility of science without belief and fails to discern the presence of belief as the ultimate source of science. The disbeliever states a real fact about religion, not offending his opponent. The believer asserts that his opponent does believe but is unaware of that. In other words, the disbeliever is a simpleton lost in his feelings.
- Pseudoscience, in contrast to religion, is disguised in the garments of science and passes its stupidities off as scientific achievements. Pseudoscience exploits the authority of science, thus discrediting knowledge. Pseudoscience hinders the intellectual liberation of humans, destroying the scientific grounds of their outlook. That is why pseudoscience is an enemy of freedom.
- Man's outlook is a personal phenomenon.

- Everybody looks at the world by themselves.
- It is in words that man perceives most of what he encounters.
- All greatest languages of the world contain the concepts of triangle, circle, square, plane, mass and weight, Archimedean spiral, molecules and atoms, Kepler's laws, electron and neutrino, flutter and jet engine, penicillin and viagra, computer and television set, etc. These concepts, stemming from science, become familiar to everybody and so enter into their mentality. The concepts of science are part and parcel of anyone's personal outlook. These concepts are the same for all, independently of race, sex, nationality, citizenship, and confession.
- The scientific outlook is of a secular character and open for discussions. It puts no limitations on the freedom of thought, freedom of belief, freedom of opinion, and freedom of conscience. The scientific outlook does not require to be confessed or observed. It entails no mysticism, nor administration of any ritual, nor service to any cult. Science acknowledges the irrevocable right of everyone to hold and manifest their opinion as well as the right to search, receive, and distribute any information and ideas. At the same time, science safeguards the freedom and independence of man from subjectivism and dogmatism, appealing to facts and logic rather than belief and tradition.
- The scientific outlook is freely accessible and provable. Science always enlightens and never proselytes. Resting on the articles of knowledge, science acknowledges that they are limited and incomplete. The scientific outlook is alien to any form of indoctrination, proselytism, absurdity, instillation, pressure, and intimidation. Man chooses scientific opinions with free will and absolute consciousness. Science is a deed of a discriminative, free, and intelligent person.
- Science is open to criticism and change, rejecting false theories and erroneous conceptions. Science respects the authority of ancient texts as well as centennial tradition, human folly, and human valor. At that, every claim or opinion of science rests on objectivity in order to safeguard man from the threats of subjectivism and collectivism.
- Objectivity and humanism are the sources of morality of the scientific outlook.
- The scientific outlook unites but never separates people. Man seeking and discovering truth is the source and aim of the scientific outlook. Science helps man to overcome the burdens of life, shows the frontiers of human knowledge and abilities, reveals the insurmountable unbeknown, and widens the residence area of the human mind. The scientific outlook liberates man's genuine abilities, never lowering his dignity and grandeur. The scientific outlook is deeply individual but collects humans, making them into mankind.
- Mankind will never abandon the scientific outlook. Nothing can extinguish the light of reason.
- The proposition that touches and wakes up thought was not pronounced in vain.
- A universal proposition is vulgar.
- Generalization makes a proposition commonplace.
- The proposition that is pondered over liberates mind.
- Beauty is a relation rather than property. There is no beauty without man. Beauty is a harmony of the properties of an object and the internal state of a subject. Harmony

can be traced objectively as consistency and falsifiability of theories. There are subjective feelings of harmony, evolving the endorphins of happiness.

- Comprehension is the harmony of what is in reality and what is perceived. That which is understood is beautiful.
- The beauty of conceptions is in their inevitability.
- The beauty of science is the comprehension of truth.
- Common sense is a special gift of *Homo sapiens*. The senses of smell, touch, eyesight, and hearing, as well as self-awareness to some extent and even the gift of speech, are shared with animals who lack common sense. Common sense is the comprehension that unites people. Common sense acts at the spur of the moment, suggesting an immediate solution. Common sense is broader than science as distinguishing good from evil. Science is deeper than common sense, justifying solutions by comprehension.
- Common sense is subjective and resembles the spiritual elan of belief, that is the force superseding the capabilities of facts and logic.
- Common sense is a kind of the vestibular apparatus of reason. The instantaneous, although not faultless, separation of right from wrong is the principal disclosure of common sense.
- Common sense is the moral law within.
- Feelings separate humans, and reason unites.
- Man produces circumstances and obeys them as time passes by. The power of many stable institutions relies on observation of written and unwritten protocols. Procedure and tradition are not so bad tools of defence against the sins and weaknesses of man.
- Everyone might compare themselves with Gauss and try to equate themselves to Gauss, but the averages and trends are treated in a different fashion. By the way, this is done on using the tricks of Gauss whose gift was far from the midpoint of the “Gaussian distribution” of talent versus social environment.
- It is hardly possible to discern no differences between national cultures. For instance, the Russian words *учёный*, *ученик*, and *учитель* have the same lexical base, whereas in English we encounter *scientist*, *pupil*, and *teacher*. *Student* stems from *study*; and *professor*, from *profess*. The Russian words *наука* and *совесть* are not lexically dependent in contrast to *science* and *conscience*. Many mental distinctions between Russian and Western scientists become clearer in this connection.
- The teacher is responsible for the quality of communication, despite his general neglect of the relevant duties. It is an easy matter to avoid “bending over backward” and deliver lectures from rotten sheets of paper, chanting that the grandparents had learned that way and you all know how good this turned out. The teacher must “do his utmost,” adapting his course to the challenges of today.
- Learning and teaching is a duty and fun.
- In contrast to the general belief, happiness lies in harmony between dreams and wishes rather than in harmony between wishes and possibilities. It is not by chance that the Bible imposes restrictions on wishes rather than dreams. Had you wishes, there would be possibilities. Rarely successful is the traversal between the Scylla of dreams and the Charybdis of wishes.

- The employer always views the failure of performance or bad performance of a contract as a fault of the contractor. In regard to the public contract, people are the employer, and the contractor is power. The principal mistake of power is the intention to benefit people with what they did not ask. Power is convinced in the stupidity of people who never know what they are truly in need of. “They will be grateful to us later on”— this is the intrinsic motivation of power.
- Absurdity remains absurdity, belief and eloquence notwithstanding.
- The gift of mathematics goes from master to student. The alternating chain of masters and students is the true savior of mathematics.
- Mental continuity is a precious gift allowing us to preserve the experience of our ancestors.
- The first transfinite act of mankind is the invention of the idea of the total assembly of naturals. From the writings by Aristotle and *Psammites* by Archimedes the idea of infinity is the focus of intellectual search of all times and nations.
- The definition of mathematics as the science of the infinite has religious roots.
- The monads of Leibniz as well as the fluxions and fluents of Newton are products of the heroic epoch of the telescope and microscope. The von Neumann universe of the mid-twentieth century implements the Pythagorean dictum—“All is number.” Measuring infinity by number is the crux of the revealing research of the genius Cantor.
- Geometry deals with the quantitative and qualitative properties of spatial forms and relations. The criteria for equality of triangles provide instances of qualitative geometric knowledge. Finding lengths, areas, and volumes exemplifies quantitative research. The incommensurability of the side and diagonal of a square became an outstanding discovery of Euclidean geometry.
- Science has confronted the problem of counting the continuum since remote ages. When our ancestors had demonstrated the absence of any common measure of the side and diagonal of a square, they understood that rational numbers are scarce for practical purposes. It is worth recalling that the set of rational numbers is equipollent with the collection of natural numbers. This means that all rational numbers comprise a countable set, thus serving as an instance of the cardinal number that we use to express the size of the imaginary collection of all entries of the natural series. The most ancient idea of the potential infinity in the form of consecutive counting turned out insufficient for quantitative analysis in geometry. The discovery that the side and diagonal of a square are incommensurable is the height of mathematics as awesome and ethereal as the independence of the fifth postulate, the axiom of choice, and the continuum hypothesis.
- Mankind needed Pythagorean triples. The result by Wiles is of no interest to mankind, although its existence feeds pride and curiosity.
- The rise of the natural series is a transfinite act.
- A straight line segment decomposes into points in the theory of convergence of Fourier series. To measure parts of a segment with transfinite numbers is the problem of the continuum in the same sense in which the ancient tried to commensurate the diagonal and side of a square.
- A number is a measure of quantity. Calculus is reduction to numbers.
- Truth is a state of reasoning. Proof is a way of reasoning.



- Mathematics was and still is the craft of formulation, the art of computation, and the science of calculus.
- Analysis appeared as differential and integral calculus. Differentiation discovers trends, and integration forecasts the future from trends.
- Geometry and topology are the calculus of spatial forms.
- Algebra is the calculus of unknowns, and logic is the calculus of truth and proof as forms of reasoning.
- Arithmetic had been the prehistory of mathematics which was born as the Hellenistic geometry, turned into the Oriental algebra, and became the Occidental analysis. The twentieth century demonstrated the benefits of reunion of the hypostases of mathematics by way of set theory which inadvertently gave rise to the utmost dogmatism.
- Model theory evaluates and counts truth and proof.
- Logic liberates mathematics by model theory.
- Mathematics becomes logic.
- Logic organizes and orders our ways of thinking, manumitting us from conservatism in choosing the objects and methods of research. Logic of today is a fine instrument and institution of mathematical freedom.
- “*Das Wesen der Mathematik liegt gerade in ihrer Freiheit.*” Therefore, the essence of a mathematician resides in freedom.
- Abstraction is the freedom of generalization. Freedom is the loftiest ideal and idea of man, but it is demanding, limited, and vexing. So is abstraction.
- Abstraction is the mother of reason and the gist of mathematics. It enables us to collect the particular instances of any many with some property we observe or study. Abstraction entails generalization and proceeds by analogy.
- Freedom is a many-place predicate.
- No freedom is exercised in solitude.
- To transform the noble desire for freedom into hatred and cruelty is a popular fixation and hobby horse of humans through ages.
- Mind proceeds by reason and vice versa.
- “Scholastic” differs from “scholar.”
- Abstraction is limited by taste, tradition, and common sense. The challenge of abstraction is alike the call of freedom.
- The ideas of description, finitism, intuitionism, and similar heroic attempts at the turn of the twentieth century in search of the sole genuine and ultimate foundation were unavoidable by way of liberating mathematics from the illusionary dreams of categoricity. The collapse of the eternal unicity and absolutism was a triumph and tragedy of the mathematical ideas of the first two decades of the twentieth century.
- The loss of certainty is a colossal acquisition of mathematics and liberation from the tethers of categoricity.
- The refusal of unicity and the desire of unity are the bicolor of mathematics in the twentieth century.

- An expert in nonstandard analysis is a nanoanalyst, nananalyst, or nonanalyst. Usage splits.
- Isomorphism is in no way a ground for unification of names. On the contrary, to speak of isomorphism we need two things (and, hence, two names). It is not by chance that mathematics is viewed as the art of telling the same in different words.
- An algorithm is an artifact of a mathematical technology.
- Any calculus is intentional.
- Technology proceeds from problem to problem using theories as signposts and tools. Theory proceeds from conception to conception, using problems as tests.
- Priority may be viewed as a binary relation. Sometimes, priority means prevalence. For instance, the interests of humans have priority over the interests of animals. Speaking about priority, in most cases we simply imply the first appearance at the time axis.
- By default, the first in time has priority. Independence of events is not directly tied with priority. The phrase “independently and twenty years later” is the testimony of the long-term ignorance and present-day stupidity of its author.
- Each great idea integrates a long prehistory, and so the priority of its formulation is often a matter of convention.
- Priority is useful, since its presence expunges accusations in plagiarism.
- Priority exists between persons, never presenting a property of an object of science. Of import to the scientist are the truth of his results and the public quest for them.
- Priority and the place in the hierarchy of the academic community are important things of shallow value to the scientist by belief.
- Who created differential calculus? This is an example of an ill-posed problem. Of use and relevance is to know how differential calculus had sprang to life. The independence of the discoveries of Leibniz and Newton is obvious, since their approaches, intellectual backgrounds, and intentions were radically different. However, the groundless priority quarrel between Leibniz and Newton has become the behavioral pattern for many generations of scientists.
- Leibniz and Newton discovered the same formulas, part of which had already been known. Leibniz, as well as Newton, had his own priority in the invention of differential and integral calculus. Indeed, these scientists suggested the versions of mathematical analysis which were based on different grounds. Leibniz founded analysis on actual infinitesimals, resting on his philosophical system known as monadology. The key of Newton was his method of “prime and ultimate ratios” which is rightfully associated with the modern limit theory.
- The insane and sleazy attempts at preserving the memory of great scientists in the names of the units of dimensional physical quantities brought to science the esoteric features of obscurantism.
- Differential calculus had appeared firstly as the technique of finite differences: some continuous shape was spread over the discrete infinitesimal frame.
- Fate puts everything in due order: the mechanistic ideas of Newton occupied an honorable place in the second row halls of the history of natural sciences, leaving the central enfilade for the views of Einstein.

- The demand ever increases of the scientific optimism of Leibniz—his dream of *Calculus* and belief in the best of the worlds. Curiously, Newton, who passed away as a top bureaucrat and pseudoscientist honored by a flock of flatterers, steps aside in the human mind to give room to the miserable and despised Leibniz whose funeral was attended just by two persons.
- There is no duality between algebra and geometry. Algebra and geometry coexist in unity.
- There are problems we fail to address: we do not know what an operator or space is in fact.
- Definitions, axioms, and proofs were prior to Euclid. The merit of Euclid is that he had seen in these the universal mechanism of defending knowledge from subjectivity.
- Immortal is the exploit of Euclid who made a universal panorama of the antique mathematics. In the eighteenth century the traditions of Euclid were sustained by Euler whose textbooks are still living. The outstanding examples of universality belong to the twentieth century. The collective project of Bourbaki neighbors the unparallel generosity of the mathematical encyclopedists Dieudonné, Lang, and Smirnov. Da Vinci, Roget, and Webster are giants of the world culture who brought fame to their nations. The exploit of Smirnov who continued the pedagogical tradition of Euler in Russia ranked him alongside Dahl and Karamzin.
- Ostrogradskii and Luzin are equal in the universality of creative contributions of their students. The traditions of universality proliferate in the best mathematical schools of Russia and, primarily, in Kolmogorov's school.
- How nice is that Gromov and Perelman carry the spiritual luggage of A. D. [Alexandrov]. How marvelous is that the world of A. N. [Kolmogorov] resides in Arnold and Gelfand. How just is that the soul of N. N. [Luzin] lived in A. N. and P. S. [Aleksandrov].
- Precedents, samples, and examples carry a definite proving force. Euclid owed nothing to Hilbert. Perelman owes much to Poincaré.
- A mathematician is not a know-it-all nor a trickster. A mathematician is one who distinguishes between what is proved and what is unproved. Mathematics requires proofs, thus setting mind in order.
- It is not shameful to be a mathematician. It is shameful to be only a mathematician.
- Mac Lane, a co-founder of category theory, coined the term “working mathematician” and confronted the work in mathematics with excellent mathematics that must be inevitable, illuminating, deep, relevant, responsive, and timely. Excellent mathematics belongs to excellent mathematicians, mathematicians *par excellence*.
- The clever author presumes the wit of the reader. Do not disappoint the clever author by neglecting the essence of his writings.
- Breakthroughs happen at the boundary with the unbeknown, i.e., at the frontiers of science.
- The boundary of knowledge is fractal and there are no reasons to assume it rectifiable or measurable.
- The proofs of the fractality of the boundary of knowledge are galore. Among them we list the ceaseless growth of pseudoscience and other instances of obscurantism.

- Any thesis is an instance of saying. Any saying is an instance of common sense. Sayings are in common parlance but it is *de mauvais ton* to proclaim that which defies the stock of adages, saws, and proverbs.
- Mathematics belongs to man, whereas formalization is the primogenitor of the computer. The computer rules over the realms of formalization. Therefore, any claim of universal formalization contradicts the most ancient and noble saying of mathematics, the Euclid Thesis which reads: “There are no king’s ways to mathematics.”
- The Euclid Thesis concerns the computer.
- The computer is an off-roader rather than dozer.
- There is no backward traffic in science.
- The quality of translation depends on many factors. In particular, it is directly proportional to the translator’s knowledge of the subject of the article under translation as well as to his mastery over the language of translation. At the same time it is inversely proportional to the translator’s confidence in his familiarity with the subject and to the self-conceit of his skills.
- Professionalism implies wit and, consequently, profound criticism which manifests itself primarily in self-control.
- *Self-esteem by clear communication*—is one of the most important mottoes of a perfect translator. In particular, there is no need in preserving the flaws you meet. Eliminate all misprints and obvious shortcomings. Battle inaccuracies and senseless expressions, but introduce any changes with utmost care, correcting only those stylistic, grammatical, terminological, and similar defects that are utterly conspicuous.
- Mathematics and economics have antipodal standards of scientific thought.
- Despite antediluvian opinions, mathematics will come in handy for the working economist.
- Calculation will supersede prophecy.
- Economics as a boon companion of mathematics will avoid merging into any esoteric part of the humanities, or politics, or belles-lettres.
- The new generations of mathematicians will treat the puzzling problems of economics as an inexhaustible source of inspiration and an attractive arena for applying and refining their formal methods.
- Ignorance is not an argument but the state revealing indolence in the past, immaturity at present, and degradation in the future. It is impossible to know everything. Therefore, ignorance is an improper positioning of oneself with respect to the boundary between the known and the unknown rather than some gaps in education.
- Ignorance is oppressive, but leaves room for perfection.
- What is watery sinks lower.
- The theory of a “mathematical superman” is the standpoint that the stronger mathematician has more rights than the weaker colleague, implying that humans are not equal in facing the longstanding laws of morality and ethics. It is this ideology that Grothendieck calls meritocratic and hates with a vengeance.
- Sycophancy of the present day, pompous moralizing, and offense to the past and ancestors are the evil deeds of a lout.

- Rudeness on bones is vile.
- It is instructive to see the absence of fastidiousness and conscience in those who consider the public rostrum for apologizing murder an indispensable call of freedom.
- The nasty things of the past are the support of the scoundrels of today and the hope of the scoundrels of the future.
- Self-conceit and boasting disparage oneself.
- Routine is a specter of illumination.
- Any good piece of research will be noticed and understood when possible.
- Criticism is a necessary trait of wit, implying self-criticism.
- The task of a scientist is to preserve and enhance knowledge. To evaluate the contribution of a scientist is a secondary matter of concern to the environment and descendants.
- A jubilee is not a rehearsal of a funeral service, but a feast of acquaintance.
- The life of a person is a unique experiment, the sequence of events governed by some hidden rules of control. There are appropriated technologies of pattern recognition, for instance, in cryptology. To see what is deciphered is sometimes possible by splitting the sequence under study and comparing the remnants in pairs. A jubilee is a day of the cameral treatment of life's data and the search for the hidden laws of the itinerary of the person whose anniversary we celebrate.
- Man is responsible to himself and the others.
- Anti-Semite is not the obligatory attribute of a rascal.
- There are plenteous choices between good and evil, and all of them are nobody's else but yours.
- Self-responsibility is an ingredient of the person's outlook: "This world is the world of mine, and I am responsible for my world."
- Self-responsibility is conscience, that is shame and blame directed to oneself.
- The presence or absence of conscience has nothing in common with responsibility to the others. Quite a few persons who served their jail terms remain absolutely irresponsible. History collects heaps of data about the pharaohs, emperors, secretary generals, and presidents that were completely devoid of conscience.
- Conscience is superior to necessity.
- To obey conscience is a chance.
- Sour is the taste of order.
- Power yields the force of order; and conscience, moral authority.
- Respect is higher than love and hatred. Sympathy is impossible without respect; and compassion, without sympathy.
- The highest gift is comprehension without which there is no compassion. Comprehension leads to truth and good, to refusal of hatred in favor of love.
- Do not that which is usual, but do that which must be done. Behave yourself not as usual but nobly.

- The past is that which was. The present is that which is. The future is that which will be. This clear-cut statement is irrefutable but prefatory. The past is the zone of responsibility. The present is the arena of action. The future is the field of possibility.
- Moral nihilism consists in oblivion of the past.
- “The past crimes are buried in the past. The past is absent at present. Therefore, the past crimes are absent now. So, let bygones be bygones.” This sophism brings about the false opinion that nobody could recall and take into account the crimes of the past in view of the period of limitations.
- No fact is ever destroyed by whatever repeals. No error disappears unless it had been repaired. Always evil is to forget the past and its lessons.
- We are responsible for the past and choose the version of the future today. Relationships between us are exactly the instances of our attitude to one another. Our means effect our aims and can lead to the latter or somewhere aside.
- To err is human, which is revealed in the presumption that everyone differs their defeats from victories. However this is groundless. We should not distinguish between defeats and victories since these are inseparable. There is neither victory free of defeat nor defeat free of victory. However, success and failure are definitely different. Defeat is connected with mistakes. The defeated learn from their mistakes and have a chance to become wiser. The victors are in a worse position: the victims surrender to the victors, pleading mercy rather than appealing to wisdom.
- Entropy grows and good turns into evil with the necessity of the second law of thermodynamics. Adaptability, adequacy, and openness transform into self-conceit, incompetence, and Machiavellianism in the conditions of uncontrollable and unlimited power. Science is not an exception. History exhibits plenty of examples, demonstrating that no branch of science inoculates its servants with morality, and any power carries the dominant gene of tyranny.
- Gerontological demarcation is useful. The enthusiasm and enterprise of the young must be commended alongside the potential of innovation and the experience of leadership of the senior generations of scientists.
- Man must know, understand, and be capable of something rather than participate in, preside over, and be a member of anything. Life rushes to its twilight, and so always reasonable is to do something important rather than wasting time on trifles. Pay debts to the elders, exhibit examples to the youngsters, and finish that which is still undone.
- Sowing truth as a tool of good is a tradition of the Russian mathematical school. Egocentrism, jealousy, hatred, and idiocy in the form of patriotic xenophobia are the pernicious weeds of science in Russia. Neither these nor other kinds of human passions can ever exterminate the shoots of truth and good as demonstrated by the tragic history of the Russian science. This leaves us hope.

**Кутателадзе Семён Самсонович**

ON SCIENCE AND BEYOND

Препринт № 226

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