

The Mathematical Intelligencer

Dmitrii Egorov: Mathematics and Theology in Russia

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1. Introduction

“The intensified class war in the USSR has pushed the right wing of the professorate into the camp of counter-revolution. The reactionary professorate has been at the head of all the recently uncovered wrecking organizations and counter-revolutionary parties. Thanks go to the brilliant efforts of the OGPU [predecessor to the KGB] for uncovering the crimes of a whole series of scientific bonzes who have known how to conceal themselves artfully behind various masks – from cold loyalty to a loudly advertised warm attachment to Soviet power. Active counter-revolutionaries have appeared even among mathematicians. Professor Egorov was arrested for participation in a counter-revolutionary organization. He is the acknowledged leader of the Moscow school of mathematics, president of the Mathematical Society, former director of the Mathematical Institute and the candidate of Moscow mathematics in the Academy of Sciences. This same Egorov is the preserver of academic traditions, against which the proletarian student body had already undertaken struggle. Nearly unanimously the Moscow mathematicians came to his defense. There has been a full clarification of the role of academic traditions in our nation, traditions coming from pre-revolutionary Russia, in the promotion of counter-revolutionary and restorationist attitudes among scientists. By the preaching of “pure science,” by the renunciation of the class struggle among scientific workers, by the preservation of caste prejudices among scientists, the counter-revolutionaries have preserved for themselves the leadership positions in scientific organizations.”

This is the opening paragraph of the *Declaration of the Initiative Group for the Reorganization of the Mathematical Society* [15]. This group consisted of five young mathematicians. It was formed in the fall of 1930 shortly after the arrest of Professor D. F. Egorov, under whose leadership Moscow had just emerged as a center of modern mathematical research.

This attack and the arrest of Egorov took place in the context of an unprecedented upheaval in the Soviet Union, launched by Stalin in 1928. It began with the ‘Shakhty affair,’ in which a large group of engineers were convicted of sabotage or ‘wrecking’ in a

widely publicized show trial. Thousands of engineers were arrested. Attacks were made on the Academy of Sciences, the most prestigious scientific institution in the country. Over the next two years, more than one hundred workers in the Academy were arrested, including six academicians. The Academy was accused, among other things, of containing an anti-Soviet religious and philosophical circle [12], page 267.

Appeals were issued to students and faculty at academic and research institutions across the country, calling on those who sympathized with the revolution to expose 'reactionaries,' 'counter-revolutionaries,' and 'wreckers' within their ranks. This is the context in which the "Initiative Group" was formed. The *Declaration* had five signatories: L. A. Lyusternik, L. G. Shnirelman, A. Gelfond, L. Pontryagin, and Nekrasov. Pontryagin's name was misspelled as Pontryashi. No initials were given for Nekrasov. Could he be A. I. Nekrasov?

The *Declaration* proceeded to enumerate the counter-revolutionary positions held by "bourgeois-democratic fellow travellers," who had been "unmasked." They included "pacifism in the class struggle," "renunciation of the necessity of revolutionary terror," and "the preaching of 'general human' morals." The name of Egorov was turned into an epithet of opprobrium, "Egorovshchina," and a conciliatory stance towards it was denounced. Particularly condemned was the idea that "it is possible to be Egorov by conviction, but honestly work with Soviet power."

Referring to the founding of the Moscow Mathematical Society in 1864, it asserted that the establishment of a serious scientific school of mathematics was not possible in Czarist times. This only became possible as a result of the revolution. The Society was accused of excluding communist mathematicians from its ranks, while continuing to list as members mathematicians who had fled the country after the revolution.

Finally it turned to religion.

"Connected with the traditions of philosophical idealism, inherited from Bugayev and others, the Society of course would not consider Marxist methodology in science. Instead 'priestcraft' and clerical obscurantism flourished in its ranks. The entire membership of the Society, beginning with its president, were active church people, using the name of Soviet science to hold up the authority of the church among the masses."

These charges are based on fact, unlike the fictitious accusations about "wrecking organizations and counter-revolutionary parties." To appreciate this we turn attention to a little-known aspect of the origins of the Moscow school of mathematics, namely its connections with the Russian religious-philosophical renaissance of the early 20th century.

2. Origins

As Marxists, the Soviet leaders were convinced that the advance of science would necessarily cause the retreat of religion. The drive against religion exerted considerable influence on Soviet philosophy of science [8], pages 76-78. Particularly unwelcome was a group of scientists whose members shared a religious outlook. The founders of the Moscow school of mathematics were just such a group.

N. V. Bugayev, a member of the Mathematics faculty of Moscow State University, was the most outstanding mathematician in Moscow in the late 19th century. He was one of the founders of the Moscow Mathematical Society in 1864 and one of Egorov's teachers. He was an exponent of the philosophical idealism that Marxism condemned. Under his leadership the Moscow Mathematical Society became firmly identified with this philosophy. Like the Marxists, he saw a connection between different philosophical world views and different approaches to mathematics.

Bugayev had a religious perspective and opposed materialism. In rejecting a mechanistic world view, he came to view discontinuity as a mathematical concept consonant with 'free will.' This together with his own mathematical interests led him to advocate the study of discontinuous functions. Bugayev and his followers sensed deeply that the development of modern science, including the social sciences, would depend increasingly on mathematical methodology. They championed the development of a more comprehensive theory of functions that could include discontinuous as well as continuous functions [24], pages 352-353.

V. Ya. Tsinger, a contemporary and colleague of Bugayev, used non-Euclidean geometry to reaffirm an idealist philosophy of science and to oppose materialism and empiricism. Empiricism, he said, could lead to materialism, which "degrades the dignity of man by negating his spiritual nature and by striving to make him a slave of matter" [24], page 350.

Egorov enrolled as an undergraduate in this Department in the fall of 1887, graduating in 1891. Among his teachers were Bugayev, Tsinger and P. A. Nekrasov, who shared the idealist philosophy of his two colleagues. Tsinger highly praised the paper Egorov submitted to the examination commission for his degree. He and Nekrasov recommended Egorov for a fellowship for graduate studies. Egorov was awarded a doctorate in 1901. After spending a year abroad, he was appointed to the faculty in 1903, the year that Bugayev died [10], pages 125-126.

P. I. Kuznetsov has written about the influence of Bugayev on Egorov [10], pages 127-128.

"Egorov's first published paper [in 1892] was written on a theme which at the end of the last century was in Moscow the subject of a considerable amount of work under the influence of Professor N. V. Bugayev – the theory of numerical integrals and derivatives. To indicate the value of this work we have to say a few words about this direction of research. At its basis lies an attempt to draw an analogy between certain transformations of elementary number theory (summation over divisors) and the operations of infinitesimal analysis. Bugayev aimed at 'discontinuous analysis.' This analogy is quite valid. Nowadays it would be stated as the analogy between the closure [completion] of the ring of integers with respect to the metric of absolute value and the closure [completion] with respect to other [p-adic] metrics. However, in Bugayev's work the analogy had a fairly formal character and did not lead him to any profound results."

Bugayev's influence is also evident in Egorov's textbook *Number Theory*, in which there is an account of the theory of "numerical integrals." Egorov wrote a paper about the work of Bugayev after his death. Kuznetsov says that there is at the present time [in 1971] a revival of interest in Bugayev's ideas, particularly with reference to combinatorial analysis.

The Moscow school of mathematics developed under Egorov and his first and most important student, N. N. Luzin, who entered the University in 1901. It is from Bugayev that they had inherited an interest in the theory of functions. Luzin had studied under Bugayev. So had B. K. Mlodzeyevskii, one of Egorov's colleagues. He had been one of the two official 'opponents' against whom Egorov defended his thesis. Mlodzeyevskii offered the first course in the theory of functions at Moscow in the fall of 1900, introducing concepts of set theory. He repeated it in the fall of 1902 [17], page 280.

3. Luzin and Florensky

The Soviet historian of mathematics Sergei S. Demidov [2] has investigated the influence of Bugayev on the origins of the Moscow school of mathematics. Much of what follows is based on this paper. The central figure in this story is P. A. Florensky. He entered the University in 1900, one year ahead of Luzin. Florensky's interest was aroused by Bugayev's ideas about the mathematics of discontinuous functions.

Florensky chose as his research topic "Ideas of continuity as an element of a world-view." He worked intensely, studying a vast literature in mathematics, physics, chemistry, biology, and philosophy. The resulting manuscript connected the study of discontinuity with Cantor's theory of sets and with the latest work of the French school of the theory of functions of a real variable. The first part of it was sufficient for his degree.

As early as January 1901 (during his freshman year!) Florensky was studying the work of Cantor, Peano, and E. Borel. He organized the extraordinary student sessions of the Moscow Mathematical Society. At these he gave a whole series of reports, including some on the new set theory. Some faculty attended these sessions, including Mlodzeyevskii and N. E. Zhukovskii, the aerodynamics pioneer and then head of the Moscow Mathematical Society.

Luzin also attended. He was one year younger than Florensky and one year behind him in school. A friendship developed between them that was subsequently maintained. Demidov and his colleagues have discovered twenty-two years of correspondence between them. Demidov surmises that the better-read Florensky with his interest in set-theoretic and function-theoretic themes influenced the young Luzin. Luzin kept a portrait of Florensky as a young man on his desk.

Florensky, in his senior year, published the first Russian language outline of Cantor's set theory. This article, entitled *On symbols of the infinite*, appeared not in a mathematics journal, but in a short-lived monthly called *Novyi Put* which was issued in 1903-4 by the Religious-Philosophical Society of Writers and Symbolists!

Central to the the founding of this Society was the theologian and mystic V. S. Solovyev who died in 1900, the year before the Society was founded. He had engaged in a long and lonely effort against the growing hostility to religion among intellectuals [27], page 100. One of his students was Alexander Blok, the great symbolist poet, who played

a major role in the Society [27], page 89. Bugayev's son Andrei Belyi, another symbolist poet, was also active in the Society. He wrote an autobiographical poem titled *A Moscow eccentric* in which his father is the major character [14], page 193. Thus, it seems, Bugayev was the first Russian mathematician to be represented as a hero in a poem!

The Society sponsored well-attended public lectures in which spokesmen for the Russian Orthodox Church and the intelligentsia called for political reform and a revival of parish life. The lectures were suspended by the regime in 1903 for their outspoken criticism of state control of the Church [27], pages 90-91. The Society was dissolved under state pressure the following year.

The Moscow Psychological Society, a center of philosophical idealism, was another organization dominated by the legacy of Solovyev. Bugayev contributed papers on 'the freedom of the will' to the journal of this Society. The idealist philosopher L. M. Lopatin endorsed Bugayev's emphasis on discontinuous functions as a recognition of "the mathematical indispensability of freedom" [24], page 354. Lopatin and S. N. Trubetskoi were convinced disciples of Solovyev's efforts to interest intellectuals in the Church. Florensky studied under both of them at the University [21], page 25. Florensky was to become one of the greatest figures in this religious-philosophical revival.

Florensky's remarkable abilities in mathematics were apparent in high school. He had come to regard science as the key to the secrets of existence. After graduation he experienced a crisis when "the limitations of physical knowledge were revealed to me." This realization, paradoxically, freed him to pursue the practical uses of science. "My strivings towards the technical applications were instilled by my father, but took form only when science ceased to be an object of faith. And later on, from that very crisis, came my interest in religion" [7], page 196.

It is not surprising that Bugayev made a great impression on Florensky. The applications of mathematics to other fields and the relationship between theology and science, which were primary concerns for Bugayev, became so for Florensky as well. Upon graduation from the University in 1904 Florensky turned down its offer of a graduate fellowship in mathematics and enrolled in the Moscow Theological Academy.

It is difficult today to appreciate the unprecedented nature of this decision. At that time most priests were trained in religious schools. Rarely did aspiring priests enter the seminary from a secular university. Rarer still was a seminarian who had studied mathematics and science, much less one who had been a top student in these fields at the prestigious Moscow State University.

Florensky graduated from the Moscow Theological Academy in 1908 and was appointed to its faculty. In 1914 he received his masters degree in theology for his thesis "*The Pillar and Foundation of Truth.*" This work is over 800 pages in length, including 400 pages of footnotes and commentaries, and "marked the beginning of a new era in Russian theology" [27], page 101. Egorov read it and discussed it in a letter to Luzin, stating "I found much of interest in it." (See [5], letter of 27 July 1914.)

Florensky became editor of the theological journal of the Moscow Theological Academy, *Bogoslovskii Vestnik*, and named Luzin as one he hoped would write articles for it [22], page 301. We do not know whether Luzin ever did so. Florensky once wrote to

Luzin about an article he was expecting from him [3]. Luzin's interest in such questions is evident both from his subsequent works and his correspondence. Luzin's contemporaries, in particular A. N. Krylov and H. Lebesgue, noted his philosophical interests.

Unlike Florensky, however, Luzin was primarily a mathematician. Still, I find it interesting that Luzin waited three years after graduation before committing himself to graduate study in mathematics [17], page 283. He attended lectures first in medicine and then in philosophy. In a letter to Luzin during this period Egorov beseeched him not to give up mathematics. (See [5], letter of 21 January 1907. See also the letter translated in [19].) He expressed his utmost concern for Luzin who, in a "spiritual depression," had left town to see Florensky. During this period Luzin apparently experienced a desire to work among the people [1], page 335. Did Florensky's dramatic switch to theology cause him to also consider a radical change in career?

4. The Moscow school

When Luzin finally decided, in 1909, to resume mathematics, he studied one year with Egorov and then went abroad for four years. During his first year abroad, Luzin and Egorov each published a significant paper in the theory of functions. This is commonly taken as the birthdate of the Moscow school of the theory of functions.

As Egorov had done before him, Luzin traveled to Göttingen and Paris, where he became acquainted with the leading mathematicians working on the theory of functions. He returned to Moscow and in two more years completed his famous treatise on trigonometric series. In 1916 he was appointed to the faculty. Over the next ten years he and Egorov attracted a whole series of students who became first-rate mathematicians, thus creating the Moscow school of mathematics.

Although Egorov was reserved and formal, Luzin was extroverted and theatrical, inspiring real devotion among these students and young colleagues [26], page 24. A member of this group, M. A. Lavrentev [11], has described the intense camaraderie and ritual forms of the group, which resembled a secret order. This was inspired by Luzin. Egorov seems to have been completely outside of it. Indeed, the 'special language' of the order might have seemed to Egorov to border on sacrilege. Lyusternik, one of the "Initiative Group" who had been part of this group, wrote a poem about the gripping enthusiasm – and jealousy – that he experienced [17], page 301. He described an unnamed professor who expressed contempt for this behavior [23]. Might this have been Egorov?

It is interesting to observe how Lyusternik handled his attack on Egorov in his memoirs. He approached the topic several times, referring to a "crisis" in Moscow mathematics "around 1930," but was unable to bring himself to say anything more about it. The closest he came was the following remark about Egorov: "this steadfast man evidently saw it as his duty to preserve the old university traditions uncompromisingly as he understood them, even when it led to inevitable conflicts" [14], page 199.

Lyusternik painted a positive picture of Bugayev, [14], page 192, and treated most of the pre-revolutionary mathematicians favorably. He told of an episode in which, on behalf of a student, Egorov intervened with Lunacharskii, a high Soviet official [14], page 189.

The students and young colleagues went to Egorov's house three times a year, at

Easter, Christmas, and on his name-day. The name-day refers to the day in the church calendar devoted to Saint Dmitrii, for whom Egorov was named. He was not only a member but an elder (lay leader) in the Russian Orthodox Church.

5. Egorov under attack

The Church experienced a wave of violent repression after the revolution that culminated in a mass execution of clergy in 1922-3. This led to a rise in religiosity across the country. Lay people, including members of the intelligentsia, stepped in to defend the Church [18], pages 99-102. The attack renewed in 1928. During the next ten years, nearly all religious communities were swept away in a tide of destruction [18], chapter 5.

Egorov publicly defended his leadership in the Church, and tried to shelter academics who had been dismissed from their positions. He resisted the imposition of Soviet controls on academia, and the admitting of large numbers of students chosen for their political rather than mathematical ability. Once when a graduate student, V. Molodshii, came to ask him about mathematics wearing the symbol of the Komsomol (Communist Youth League), Egorov refused to talk with him [3].

Egorov was a leading figure in the Moscow Mathematical Society. He was elected secretary in 1917, vice-president in 1921, and president in 1923. In 1921, under the influence of the Society, the Institute for Mechanics and Mathematics was created at Moscow State University to promote research. In 1923 Egorov became director. One of his students, V. A. Kostitsyn, became secretary. In 1923 Egorov was also appointed Chairman of the Mathematical Syllabus Commission of the University [10], page 127.

Egorov had been elected a corresponding member of the Academy of Sciences in 1924, and an honorary member on 13 February 1929 [10], page 127. This last appointment is noteworthy because the Academy was then under severe pressure. At that meeting, for the first time, candidates of the party were forced into the Academy (including the recently rehabilitated Nikolai Bukharin) [6], page 103.

In the mid-1920s a "war" was declared on Egorov in his capacity as head of both the Society and the Institute. He was forced to resign as Chairman of the Mathematical Syllabus Commission of the University. In 1929, he was dismissed as director of the Institute, which was reorganized, and "a sharp proletarianization of personnel was conducted" [25]. Egorov was given a public rebuke at a meeting of graduate students of Moscow State University on 21 December 1929. They then adopted an annual work plan that committed themselves, among other things, to do "antireligious work" [4]. (See Joravsky [8], pages 242-244 for this entire section. See also [13].)

Another mathematician entered the conflict, Ernst Kolman, a militant Marxist. He denounced the Society for stubbornly refusing to expel Egorov. From him we have the only publicly recorded response that Egorov gave to the charge of "wrecking": "genuine wrecking is nothing other than the imposition of a standard worldview on scientists" [9], page 79. This referred to the attempt to impose Marxist methodology on science. The statement was made during the presentation of a paper at a meeting of the Society. Kolman was particularly incensed because:

“the speaker, a communist, not only did not rebuke him, but in his concluding statement he ignored a proposal to have the organization deal with Egorov’s statement, having explained everything as a ‘misunderstanding’.”

Kolman went on to denounce the guardians of the traditions of Tsinger, Bugayev, Nekrasov and Lopatin for attempting to uphold “Orthodoxy, autocracy, and nationalism.”

Although it was hopeless, Egorov continued to resist. As president of the Society, he continued to make it “a refuge where the old spirit reigned.” He was the leading figure at the All-Union Congress of Mathematicians held in June 1930, which had the effrontery to refuse to send greetings to the Sixteenth Congress of the Communist Party meeting at the same time [9], page 79, [8], page 243.

6. Egorov’s fate

Not long after that Egorov was arrested. Even then, the Society continued to resist by conducting its next meeting as though nothing had happened. The meeting was devoted to reports by S. P. Finikov, one of Egorov’s students and his closest administrative collaborator, and by Kurosh. For that Kurosh was expelled from the Komsomol [15], page 70. (He was later readmitted [8], note 51, page 372.)

This prompted the formation of the “Initiative Group” and the *Declaration*. It declared with satisfaction that Finikov had been expelled from the faculty of the Institute, and that the Society was about to undergo “reorganization,” in accordance with an eight point program, which included political reeducation and struggle against “a conciliatory attitude toward religion and idealistic philosophy.” This was a rebuke to those, like the communist denounced by Kolman, who had no desire to purge the Society. Tribute was paid to the “Leninist guidance of our experienced leader comrade Stalin.” Although the majority of the signers were not party members, they promised to “compensate” for not having been involved in the struggle earlier.

At the next meeting of the Society, on 21 November 1930, the “Initiative Group” took control. Finikov attempted to protect Egorov and was expelled [25]. The results were announced in a note from the editors in the next issue of the journal published by the Society [16]. It reported that the Society had adopted the *Declaration*. Egorov was denounced as “a reactionary and a churchman.” He and “other reactionaries” had been expelled. New leadership had been elected. Lyusternik was now editor-in-chief. Gelfond was secretary. The word *Soviet* was being added to the name of the journal. The new name was never actually used [20]. In fact the Society ceased functioning for a year. It was revived in 1932 [8], page 244.

Egorov resisted to the end. He was exiled to Kazan where his friend Chebotarev was on the faculty. Although Egorov was a member of the Kazan Physico-Mathematical Society, no one else was courageous enough to associate with him. He was living in isolation and on a hunger strike when Chebotarev managed to bribe his way in to visit him. Chebotarev finally convinced Egorov to give up the hunger strike, but too late. He was already seriously ill. He asked for a Bible. His wife was finally allowed to join him [3]. On 10 September 1931, he died in Chebotarev’s home, in his arms [26], page 24. Only Chebotarev and

Egorov's wife were present at the funeral.

On 25 September 1931 *Izvestiya* announced his death and his burial in the Arskoye Cemetery in Kazan [10], page 127.

References and Notes

Note: Except for the widely used spellings of Egorov and Florensky, I have tried to use a consistent transliteration scheme.

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- translation of this article and the one by Demidov.
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 23. *Uspekhi Matematicheskikh Nauk*, 25, 6 (1970), Lazar Aronovich Lyusternik, 3-10 (Russian). In the poem on page 4 Lyusternik represented the unnamed professor with the latin letter Y. This suggests Egorov because Y is the first letter in many transliterations of that name.
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