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Historia Mathematica 31 (2004) 337–367

HISTORIA
MATHEMATICA

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Mathematics, religion, and Marxism in the Soviet Union in the 1930s

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Available online 23 October 2003

Abstract

Mathematicians and traditional pure mathematics in the U.S.S.R. came under attack in the 1930s from the platforms of religion and nationalism in attempts to establish dialectical materialist mathematics. These platforms came to light at the 16th Congress of the All-Union Communist Party in 1930. A leader of the attacks was the mathematically inclined Marxist/Stalinist ideologue Ernst Kolman (1892–1979), in whose writings randomness and probability (more amenable to philosophical discourse than other areas of mathematics) are recurring issues. The recently rediscovered booklet *Mathematics and Religion*, written in 1933 under the influence of Kolman by the mathematician and political activist Mikhail Kh. Orlov (1900–1936), encompasses the Bolshevik position on mathematics and religion. A nucleus of vilification in Orlov's book for his religiously inclined pre-revolutionary writings is the mathematician Pavel Alekseevich Nekrasov (1853–1924), and by extension, the Moscow Mathematical Society, a focus of attack by Kolman and others. The attacks, and especially the probabilistic aspects are studied below under a sequence of headings: Mathematics and the 16th Party Congress; Moscow Mathematical Society; Nekrasov's Probability and Social Physics; Politically Correct Probability; Politically Correct Statistics?; Orlov, Religion, and Mathematics; Orlov and Kolman on Religion and Mathematics. There are biographical appendices on Kolman and Orlov. The outstanding mathematician/probabilists of the time, Andrei N. Kolmogorov (1903–1987) and Sergei N. Bernstein (1880–1968), were prominent among the obstacles to the "reforms" of Kolman (in Moscow) and Orlov (in Ukraine), respectively, and feature in this study.

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Résumé

Au cours des années Trente en U.S.S.R. les mathématiciens et les mathématiques pures traditionnelles ont été l'objet d'attaques de nature religieuse et nationaliste, en vue d'établir des mathématiques « matérialistes dialectiques. » Ces attaques se sont manifestées au 16e congrès du PCUS en 1930. L'un des leaders en était l'idéologue Ernst Kol'man (1892–1979), mathématicien de tendance marxiste-stalinienne, dont les écrits portaient de façon récurrente sur l'aléatoire et les probabilités (discipline plus sensible aux discours philosophiques que le reste des mathématiques). L'opuscule récemment redécouvert *Mathématiques et Religion*, écrit en 1933 par le mathématicien et militant politique Mikhail Kh. Orlov (1900–1936) sous l'influence de Kol'man, développe la position bolchévique sur les mathématiques et la religion. Dans le livre d'Orlov, le mathématicien Pavel Alekseevich Nekrasov (1853–1924) est l'objet central du dénigrement, en raison de ses écrits pré-révolutionnaires

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doi:10.1016/S0315-0860(03)00046-6

d'orientation religieuse; par extension, la Société mathématique de Moscou se trouve au centre de l'attaque conduite par Kol'man et d'autres militants. Ce sont ces attaques, et tout particulièrement leurs aspects probabilistes que nous étudions ci-après, dans les paragraphes suivants : Les mathématiques et le 16e Congrès du Parti; La Société mathématique de Moscou; Les probabilités chez Nekrasov et la physique sociale; Les probabilités politiquement correctes; La statistique politiquement correcte?; Orlov, religion et mathématiques; Orlov et Kol'man à propos de religion et de mathématiques. Nous donnons des appendices biographiques sur Orlov et Kol'man. Les éminents mathématiciens/probabilistes de l'époque, Andrei N. Kolmogorov (1903–1987) et Sergei N. Bernstein (1880–1968), furent des obstacles majeurs aux «réformes» de Kol'man (à Moscou) et Orlov (en Ukraine) et sont des acteurs importants de notre étude.

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MSC: 01A60; 01A70; 01A80; 60-03; 62-03

Keywords: Kolman; Orlov; Nekrasov; Florensky; Buniakovsky; Markov; Kolmogorov; S.N. Bernstein; Marxism; Stalinism; Dialectical materialism; Religion; Moscow Mathematical Society; Philosophy; Probability; Statistics; Bayesian inference; Free will; Social physics; Ukraine

1. Introduction

In his relatively early and erudite analysis, which highlights the consequences for mathematics, Joravsky (1961, Ch. 16, “The Great Break for Natural Scientists”) begins:

Midway through the fury of his first Five Year Plan Stalin singled out 1929 as “the year of the great break [*perelom*],” the year of shattering transformation, “on all fronts of socialist construction”... In this brief period [to mid 1932] the scientific change-over from “bourgeois” to “red” specialists, and the accompanying search for a suitable philosophy or ideology of science ... reached a breaking point, by which past trends were selected, some for destruction, others for dominance over a generation of Soviet scientists and philosophers of science.

In regard to mathematics, in Joravsky's account the name of E. Kolman (“a 38-year old Bolshevik mathematician”) recurs as agitator and activist zealously supporting the Stalinist ideology. In an earlier chapter referring to the pre-Stalin period, Joravsky notes that Kolman's [1926] ideological criticism in the Bolshevik ideological journal *Pod Znamenem Marksizma* [*Under the Banner of Marxism*] of a 1925 book *Logika Estestvoznaniia* [*The Logic of Science*] by I.E. Orlov, one of the most active Marxist commentators on mathematics, effectively silenced Orlov. (See also, more recently, Vucinich [1999].) This may have been Kolman's first article; it is concerned with probabilistic issues and is characteristic of Kolman's later articles, which tend to have much dialectical materialist philosophy and many names of scientists to give the impression of wide reading, but have little or no formal mathematics. Randomness (*sluchainost*) and probability are recurring issues in Kolman's writings, since the capacity for interpretation of these concepts in a real world setting make them more amenable to philosophical discourse in a manner akin to issues in physics than other areas of mathematics. Curiously, this 1926 article of Kolman is not mentioned in the listing of his papers, which begin with 1929, in *Matematika 40 Let* [1959, 325–326]. While publication listings in *Matematika* are not complete in general, the reason for this specific omission is conjectural.

Ernst (Ernest, Arnošt) Kolman (1892–1979), particularly since his asylum in Sweden in 1976, followed by his open letter to Brezhnev and his apologist autobiography [Kolman, 1982a, 1982b], in German and Russian, respectively), titled or subtitled *The Lost Generation* and *We Should Not Have Lived That Way*, has come increasingly in the West to be regarded as an eminent Marxist philosopher, humanist,

and mathematician (e.g., prefaces to his autobiography, Zinner [1963], Kovaly [1974], Hruby [1980]). He first came to English-speaking Marxist attention in the heady fashionably left-wing atmosphere of interwar Britain as part of the U.S.S.R. delegation to the 1931 International Congress of the History of Science and Technology, held in London June 29 to July 3. In a New Foreword to the second edition of the collected papers, *Science at the Crossroads* [Crossroads, 1971, ix], Joseph Needham, F.R.S. reflects that “Lastly, E. Kol’man’s discussion was of great interest to mathematicians.” Kolman presented several items at the conference, the best known internationally being [*sic*] Colman [1931]. A Russian-language version of this paper had been read to the Leningrad Society of Marxist Mathematicians on 27 April, 1931, and appears as Kolman [1931, 203–215]. An English-language sample of his philosophical writings is Kolman [1965]. Professionally, Kolman was later more successful as a historian of mathematics [Kolman, 1961], especially when writing about a subject close to his heart [Kolman, 1955], if one discounts the ideological bias.

Recently Kolman’s activities as Marxist mathematical ideolog, with biographical context, and specially his relationship with the eminent Dutch-American Marxist mathematician Dirk J. Struik (1894–2000) have been treated by Ford [2002]. In the sequel we will be concerned with attacks on the mathematical establishment from the standpoint of religion (specifically the Russian Orthodox religion) in which Kolman in the guise of Marxist, or rather Stalinist, philosopher played a leading role. Religion linked with probabilistic notions provided a convenient ground, as did suspected nationalism, for such attacks and not only by Kolman, in place of making clear the elusive notion of how dialectical materialist mathematics should differ from traditional pure mathematics.

The studies of Joravsky [1961] and very recently Vucinich [1999, 2000] and Ford [1999] do not explore these grounds, which come to light formally in the speech [Kaganovich, 1931, 75] of Lazar M. Kaganovich (1893–1991), Secretary-General of the Ukrainian Party’s Central Committee and Stalin’s henchman, at the all-important 16th Congress of the All-Union Communist Party (Bolshevik) in 1930 in the then capital of the Ukrainian S.S.R., Kharkiv [Kharkov]. In this speech and Congress, treated below, Kolman was a hidden, but important, ideological influence.

Five years later, on July 3, 1936, through an anonymous letter published in the Party organ *Pravda* entitled “On enemies hiding behind a Soviet mask,” Kolman initiated and then orchestrated the “Luzin Affair,” which exploited [Demidov and Esakov, 1999, 12]

the conflict within the Moscow Mathematical Society to destroy the remnants of the reactionary Moscow philosophical–mathematical School abhorrent to him

on the grounds of lack of patriotism of the Soviet scholar. The prime target was the leader of the mathematical establishment, Nikolai Nikolaevich Luzin (1883–1950), who had continued after the onset of the Soviet regime to spend long periods outside the U.S.S.R., to publish in foreign journals, who was “reactionary” and “anti-Soviet” as already evidenced during the last decades of the Tsarist regime, and whom it was also possible to attack on the grounds of plagiarism [Demidov and Esakov, 1999, 21]. The meetings of the rapidly convened Extraordinary Commission of the Academy of Science of the U.S.S.R. to judge Luzin, threatening his possible expulsion from the Academy, took place also in July, but the proceedings were stopped, just as they had been condoned, by order from “on high,” that is, by Stalin himself. The aims of the ideological attack were largely successful. The Luzin Affair has been incisively and extensively studied on the basis of rediscovered documentation and Commission transcripts through the efforts of the workers of the Institute for History of Science and Technology in Moscow. The study is

available within Demidov and Levshin [1999], and through some of the papers cited here (e.g., Demidov and Ford [1996]). The Luzin Affair is an important epoch in the history of Kolman's ongoing attacks on traditional mathematics and his political evolution.

It is necessary for the reader's understanding of the times with which are concerned to have a brief biographical sketch of Kolman to that point in time, even though there is overlap with Ford [2002] in this respect. This (see Appendix A) is followed by a biographical sketch (Appendix B) of the mathematician and political activist Mikhail Kh. Orlov (1900–1936), whose newly rediscovered booklet *Matematyka i Religiiia*, written, it would seem, under the influence of Kolman, albeit in Ukrainian, encompassed the Bolshevik position on mathematics and religion and served as the primary impetus for our paper. The role of Orlov interacts with the position of the eminent mathematician and probabilist Sergei N. Bernstein (1880–1968), just as that of Kolman clashes with the position of the younger but outstanding figure Andrei N. Kolmogorov (1903–1987). (See specifically Lorentz [2002].) In the present study we have reluctantly narrowed the scope to treat these interactions only in passing.

The earlier study by Ford [1991] on mathematics and religion is partly a springboard for the present one and for the direction we take. Ford's study is largely concerned with circumstances leading to the arrest in 1930 and death in 1931 of the Head of the Moscow Mathematical Society and Luzin's mentor, the strongly religious Dmitrii F. Egorov.

2. Mathematics and the 16th Party Congress

Concurrent with this Congress and also in Kharkiv was the All-Union Congress of Mathematicians, held 24–29 June 1930. The leading mathematician in Kharkiv of the time, no doubt involved with the organization of the conference, was S.N. Bernstein, who, like Kolmogorov, had little tolerance for Marxist interference with science, and eventually left Kharkiv, probably on account of ideological differences with Orlov (see Appendix B). There was a motion to send greetings from this mathematical Congress to the Communist Party Congress; the motion was not supported by Bernstein and Egorov in particular. The telegram was nevertheless sent [Demidov and Esakov, 1999, 17]. There was much about this “anti-Soviet position” of Bernstein and Egorov in the Soviet newspapers; and the episode gave rise to anecdotes about Bernstein and Stalin. Egorov was arrested in September 1930. Against this background, here is an extract from Kaganovich's speech to the 16th Congress, along the general lines of the existence of ideological inadequacies (*nedostatki*) and the need for exceeding vigilance (*velichaishaia bditel'nost*) on the cultural front:

Now for an example from the philosophical literature. In “Pravda” there was a review of seven books of the obscurantist (*mrakobes*) philosopher Losev. But the last book of this reactionary and member of the black hundreds¹ (*chornosotentsia*) under the name “The Dialectics of a Myth” . . . is the most outspoken propaganda of the most barefaced class enemy . . . I will give just a few citations from this counter-revolutionary and obscurantist: “. . . And I for all my sins cannot comprehend how the earth can move. To this time I cannot convince myself that the earth moves, and that there is no sky (*nebo*)².” “Catholicism, which wanted the salvation of the living and real world, had logically every right to destroy Giordano Bruno . . .” “Dialectical materialism is flagrant absurdity” . . . “. . . Only the monk . . . knows the depth and beauty of a woman's soul” . . . “Communists shouldn't like art. Because art means genius. Genius means inequality. Inequality means exploitation.”

¹ Black hundreds: extreme right-wing elements in early 20th century Russia. They supported antisemitism, autocracy, and Russian ultranationalism.

² The word *nebo* has a dual meaning of sky and heaven.

This rather clever mix of citations separates the sheep from the goats clearly: on one side: Marxism, dialectical materialism, atheism; on the other: religion, classical philosophy, bourgeois mindset. And there is a hidden fact, with significant consequences: Losev was a philosopher, interested in mathematics, and a friend of Egorov. To whom might Kaganovich have turned for the source of such citations? Kolman was ideologically correct, especially antireligious, mathematician, physical scientist, philosopher, and in some sense censor (through Agitprop) of books of this nature published in the Soviet Union, was in fact present during the 16th Congress, and was a member of the editorial committee. Did Kolman perhaps even suggest the ideological line of the attack?

Even before the Congress, in the *Criticism and Bibliography* section of a leading Marxist journal, Kolman [1929] had published a stinging attack on S.A. Bogomolov's [1928] *Evolutsiia Geometricheskoi Misli* [*The Evolution of Geometrical Thought*] about which Kolman concludes:

Mysticism, popistry, the laws of the world beyond (*potustoronnogo*) are the logical culmination of the author's entire ideological concept: geometry is the product of the pure mind, that gift of divine origin. It is the ante-chamber to true philosophy–mysticism. To prove this is the real intention of the author [Bogomolov].

M.Kh. Orlov [1933] soon after used this review by Kolman as the foundation for his Section 14: “Bogomolov—the ideological descendant of Nekrasov.” Orlov's connection to Kolman manifests itself, possibly for the first time, in an article whose author is “M. Orlov (Kharkov)” and whose title in English translation is *Against Idealism in Mathematics*. This appeared in Russian as pp. 216–221 of a remarkable collection of papers orchestrated by Kolman [1931], and published by the Communist Academy's Association of Institutes of Science, Mathematics Section. Kolman's leading article is a printing from the inaugural meeting of the “Society of materialist–dialectical physicists and mathematicians,” March 1, 1930. Orlov's article has the footnote:

Translation from the Ukrainian. The original version published in the collection [*Sbornik*] appearing in the summer of 1930 ... (associated with the XVI party congress).

The year 1931 seems to have been crucial in Orlov's rise to influence (see Appendix B). He appears to have been suitably ideologically pure, with a bent for dialectics and activism, and yet a better—and certainly better-trained—mathematician than Kolman. He would become an important ally for Kolman on the Ukrainian (specifically Kharkiv–Kyiv) scene, not considered by Vucinich [1999, 2000].

The Kharkiv Mathematical Congress formulated, amongst other “problems” the application of dialectical and historical materialism to the history of mathematics and its foundations [Bogoliubov, 1991].

Possibly as a result of the momentum gained at Kharkiv, and his activities in Moscow connected with the Moscow Mathematical Society, Kolman and another member (Dzenis) of the presidium of the Communist Academy under the chairmanship of Manuilsky were assigned to carry out a purge of party members in Ukraine in 1932. This was the time of the artificial famine in Ukraine aimed at annihilating the *kulak* class of peasants, described by Robert Conquest [1986]. In the cities people were dying of hunger in the streets. Kolman was assigned to check the party organizations of the Ukrainian Academy of Science and the universities in Kyiv and Chernyiv [Chernigov] and several pedinstitutes [teachers' colleges]. He writes

Since the investigating commissions worked in the evenings ... by day I had enough free time ... to acquaint myself thoroughly with the classical Ukrainian literature ... and with pleasure read the works of Shevchenko, Lesia Ukrainka, ... I carried out the purge adhering strictly to directives received: to purge Ukrainian nationalists, hidden Trotskyites and various enemies of the Party. ... As I think now: as did the whole commission, so I purged many innocent fine people, sincere Communists.” [Kolman, 1982b, 185–186]

It seems not unconnected with Kolman’s sojourn in Kyiv that Orlov was sent in 1934 to the Institute of Mathematics of the Ukrainian Academy of Science, and Kyiv University, to maintain the proper ideological line.

The biographical sketch (Appendix A) mentions that Kolman worked in 1929–1935 in the Communist Academy. The Bolsheviks had founded after the Revolution the Socialist Academy (renamed the Communist Academy in 1923) which was assigned the task of making Marxism a unified and coherent system of philosophical propositions [Vucinich, 1999, 107–108]. In Kolman [1982b, 132] he describes its functions in 1929 as overseeing the development of social and physical sciences on dialectical materialist foundations. The Imperial Academy of Sciences was named for a time the Russian Academy of Sciences after the revolution and then renamed the *Akademiia Nauk SSSR* [Academy of Sciences of the USSR]. It tended to continue the old traditions of academic isolation and only in 1929 began to allow the influence of Marxist thought [Joravsky, 1961, 234–235]. The Party’s Central Committee declared on March 15, 1931 that the Communist Academy, formerly the directing center for the network of Communists institutions, would now direct all institutions [Joravsky, 1961, 244]. The Communist Academy consisted largely of youthful cadres poorly trained in science. Some of the good young mathematicians (A.O. Gelfond, L.A. Liusternik, L.G. Shnirelman) published in the early numbers of the journal, founded in 1929 by its Section for the Natural and Exact Sciences, *Estestvoznaniia i Marksizm* [Science and Marxism]. Kolman was within the list of editors by the time of appearance of No. 4 in 1929. He occupied a prominent position in this Section, and was perhaps the leading light, because of the scarcity of ideologically correct activist senior scientists to counteract the conservatives united in the institutions and organizations such as the Moscow Mathematical Society [Ford, 1999]. The Mathematical Section was headed from 1927 by the very capable young mathematical statistician Valentin Ivanovich Khotimsky (1892–1937), of whom more below.

The Communist Academy was abolished in 1936 [Vucinich, 1999] and its major institutes were transferred to the *Akademiia Nauk SSSR*. Zinner [1963, 128] says that Kolman “at one time headed the section on dialectical materialism of the Soviet Academy of Sciences.” This likely refers to the AN SSSR and is supported by the fact that Kolman [1940] published in the *Doklady AN SSR*, supporting the Lysenkoite destruction of Mendelian genetics against its defense by Kolmogorov [1940].

Kolman [1979, 159–160] writes: “1934 erwarb ich den akademischen Grad des Doktors der philosophischen Wissenschaften und den Grad eines Professors der Mathematik. Ich hielt einen Kurs über die Philosophie der Mathematik sowohl im Institut der Roten Professur als auch an der Moskauer-Staatsuniversität.” Kolman’s ideological influence was everywhere, and was rewarded by, one would think, much desired formal qualifications. It is not clear by whom (the Communist Academy?) these qualifications were awarded. Franišek Janouch, Kolman’s son-in-law, in the biographical sketch at the beginning of Kolman [1982b] describes him as Doctor of Philosophy of Charles University (Prague, Czechoslovakia). Regarding the Institute of Red Professors:³ this organization had a “cell of philosophy” [Ford, 2002], with Kolman presumably as head, although not yet himself a “professor”: Ford mentions

³ In Kolman [1982a, 447] this is described as “Fachschnle für die wissenschaftliche Ausbildung von Parteikadern.”

a conversation by Stalin with the presidium of the “cell” on 9 December, 1930. This is of course shortly after the 16th Party Congress; the founding of the “society of materialist–dialectical physicists and mathematicians,” March 1, 1930, was a little before.

But perhaps Kolman’s greatest agitational success was with respect to the “reorganization” of the Moscow Mathematical Society.

3. Moscow Mathematical Society

A good account of the Marxist pressure on the “otherworldly” Moscow Mathematical Society and its then Head, Dmitrii F. Egorov, in 1929 to 1930 is given by [Joravsky \[1961, 242–244\]](#). See also [Liusternik \[1967\]](#) and [Lorentz \[2002\]](#). After the arrest of Egorov an “Initiative Group for the Reorganization of the Mathematical Society” took over and announced in the next issue (Nos. 1–2 of 1931) of the Society’s famous old organ *Matematicheskii Sbornik* that henceforth it would appear under the name *Sovietskii Matematicheskii Sbornik*; the “initiative group” consisted of L.A. Liusternik, L.G. Shnirelman, A. Gelfond, L.S. Pontriagin, and Nekrasov. At least four of these were gifted young mathematicians. The “Nekrasov” in this account was K.P. Nekrasov,⁴ the son of Pavel Alekseevich Nekrasov (1853–1924), mentioned in our [Section 2](#). According to [Joravsky \[1961, 244\]](#)

The Society was not reorganized but simply ceased functioning for more than a year ... not in the public record ... are the steps leading to the revival of the Society in 1932.

In fact Kolman was the driving force behind the “initiative group.” An inaugural publication of a journal by the Mathematics Section of the Communist Academy has timing, name (in English translation: *Mathematical Sciences for Proletarian Cadres* [[Kolman et al., 1931](#)]), and contents suggesting that it is intended to replace *Matematicheskii Sbornik* with something ideologically acceptable. There is a Chronology (*Khronika*) section, one part (p. 48) of which is titled *Reorganizatsia Moskovskogo Matematicheskago Obschestva* [*Reorganization of the Moscow Mathematical Society*]. Striking is that the elected new presidium of the Society consists of Kolman, Vygodsky, Khotimsky, Gelfond, Orlov, Burstyn, Khinchin, Golubev, Raikov, Frankl, Ianovskaia, Liusternik, and Lavrentiev. In being listed first, Kolman replaces the arrested Egorov as Head of the Society. There is little doubt that “Orlov” is M.Kh. Orlov. The list contains names which became world-famous in mathematics. Two members of the initiative group, Pontriagin, who also attained great eminence, and Shnirelman, are not explicitly listed.

Egorov was replaced in another post, as Director for 1930–1931 at the Institute of Mathematics and Mechanics, by the Bolshevik mathematician O.Yu. Schmidt, who was charged with changing its direction to a Marxist one. In 1932 Schmidt became Chief Editor of *Matematicheskii Sbornik* and Editor of the *Bolshaia Sovietskaia Entsiklopediia* [*Great Soviet Encyclopedia*], [BSE \[1938\]](#).

Ideological animosity between the Moscow Mathematical Society and socialist–atheist activists was of long standing on the grounds of religion. [Ford \[1991\]](#) describes the religious perspectives and connections of Nikolai V. Bugaiev (1837–1903), one of the founders of the Society in 1864, his student and later Head of the Society, Dmitrii F. Egorov (1869–1931), his student Nikolai N. Luzin (1883–1950) and

⁴ [Demidov and Esakov \[1999, 48, 214\]](#), from a discovery by Charles Ford in the Moscow University Archive.

Luzin’s friend, who became a Russian Orthodox priest, Pavel A. Florensky (1882–1937). The years 1936–1938 were a time when Stalinist terror reached its peak. Even Kolman was affected ([Appendix A; Kolman \[1982a, 153\]](#)) and his colleagues M.Kh. Orlov (1900–1936) and V.I. Khotimsky (1892–1937) were arrested and executed during this time.⁵

Florensky acquired great eminence as a scientist and theologian; his 1914 treatise [[Florensky, 1990](#)] contains many mathematical and logical arguments. For example, there is a critique of Laplace’s perception of Pascal’s Wager (*Le pari*) within a theological context and an adaptation for theological reasons of a logical argument of Lewis Carroll [the logician C.L. Dodgson] [[Seneta, 1998a](#)]. Florensky, a prime target for Marxist philosophers such as Kolman, and for them an outstanding “success,” occupies the primary role in our [Section 8](#).

Bugaiev was philosophically a firm believer in “free will” as opposed to “determinism” and sought reflection of such philosophical ideas in his mathematics. He perceived “discontinuity” of functions as reflecting free will. A spiritual person and a committed Russian Orthodox Christian, he firmly rejected materialism. Under his leadership the Moscow Mathematical Society identified with his philosophical approach linking religion with mathematics, and their views were widely promulgated. Inevitably these views would infringe on, and attempt to encompass, empirically observed but rationally inexplicable phenomena such as statistical regularity, which were reflected in mathematical theorems such as Bernoulli’s Weak Law of Large Numbers (WLLN). The foremost exponent of this statistical appropriation and the linking of the WLLN to “free will” was the younger colleague of Bugaiev, Pavel Alekseevich Nekrasov (1853–1924), who remained extremely active in the Moscow Mathematical Society right up to the Bolshevik revolution (and indeed participated in its meetings afterward), publishing copiously and obscurely in its organ *Matematicheskii Sbornik* (see [Seneta \[1984\]](#), which contains a translated obituary by [Sluginov \[1927\]](#); Buckingham,⁶ [1999]). Nekrasov’s writings and activities before the Revolution became a convenient platform of attack for Kolman in the late 1920s and 1930s and for [Orlov \[1933\]](#).

4. Nekrasov’s probability and social physics

Bernoulli’s WLLN of 1713, the first limit theorem of probability theory, states that if we consider n independent trials, at each of which a success can occur with probability p and a failure with probability $q = 1 - p$, and P_n is the proportion of successes in the n trials (and is thus a random variable), then for any fixed $\varepsilon > 0$, as $n \rightarrow \infty$,

$$\Pr(|P_n - p| \geq \varepsilon) \rightarrow 0.$$

This theorem is a mathematical abstraction of statistical regularity, inasmuch as the relative frequencies P_n stabilize (to p) with increasing n . It is most conveniently proved by the Bienaymé–Chebyshev inequality (of 1853 and 1867, respectively), usually ascribed to Pafnuty L. Chebyshev (1821–1894), the founder of the St. Petersburg School of Mathematics, who was venerated equally by Nekrasov in Moscow as by Chebyshev’s two probabilistic offspring, A.A. Markov (1856–1922) in St. Petersburg and

⁵ Kolman’s [[1982b, 132](#)] reaction to his friend Khotimsky’s arrest and disappearance circa 1937 was that it was a “mistake,” along the lines of “when trees are cut, woodchips fly.”

⁶ Where the year of birth is misprinted.

A.M. Liapunov in Kharkov, which was another major mathematical center at the time. The more general form of the WLLN as it was understood at the time arises out of the expression

$$\Pr(|\bar{X}_n - E\bar{X}_n| \geq \varepsilon) \leq \frac{\text{Var } \bar{X}_n}{\varepsilon^2} = \frac{\text{Var}(\sum_{i=1}^n X_i)}{n^2 \varepsilon^2}.$$

$\bar{X}_n = \sum_{i=1}^n X_i/n$, and $X_i, i \geq 1$, are random variables. The condition $\text{Var}(\sum_{i=1}^n X_i)/n^2 \rightarrow 0$ as $n \rightarrow \infty$ is clearly sufficient for the WLLN to hold. Now, up to the time of which we speak, the X_i 's had been implicitly *assumed to be independent* in the continuing development of the fundamental probability limit theorems (the WLLN, the central limit theorem) for sums: under this assumption

$$\text{Var} \left(\sum_{i=1}^n X_i \right) = \sum_{i=1}^n \text{Var } X_i. \quad (4.1)$$

However, Nekrasov [1902, 29] noticed that independence was not required for (4.1) to hold; “pairwise independence” (or as we would say, zero covariance) would suffice, and hence $\sum_{i=1}^n \text{Var } X_i/n^2 \rightarrow 0$ is sufficient for the WLLN. (If the X_i 's are also identically distributed, this condition is automatically satisfied.) However, Nekrasov wanted to use the empirical long-term stability of averages in everyday life (the empirical validity of the conclusion) to infer that pairwise independence is *necessary* (as well as sufficient) for the WLLN. Behind this was his belief that observed statistical laws for observational data implied “free will” and pairwise independence was consonant with free will. The “necessity” claim is mathematically unjustified and led Markov to construct in 1906 a scheme of dependent variables (a “Markov” chain) for which the WLLN held. The consequences of Nekrasov’s error here were thus important in the development of probability theory [Seneta, 1984, 1996]. Aleksander Aleksandrovich Chuprov (1874–1926), who became the most eminent of the Russian mathematical statisticians, and who had contact (as a student of mathematics) at Moscow University with Nekrasov (as professor), makes incisive comments in his fine book of 1909–1910 about Nekrasov, statistics, and free will. Indeed the celebrated Markov–Chuprov (pre-Revolutionary) correspondence [Ondar, 1981] begins with an angry postcard from Markov, an atheist and volatile fighter for scientific purity and for justice who was much acceptable to the incoming regime, to Chuprov for daring to say something positive about Nekrasov, and mentioning him in the same line as Chebyshev.

The reader will notice the subtitle of Nekrasov’s [1902] verbose book; clearly Nekrasov saw himself as a successor to Quetelet [1869], who is remembered for his quantification (“social physics”) of social phenomena and anthropology and regarded as the “patriarch of statistics” Stigler [1986] and surely the founder of anthropometry, with his key idea of *l’homme moyen*. More to the point, Quetelet studied the numerical stability of voluntary acts such as crimes and marriages within a philosophical framework of free will versus social determinism. Such philosophizing ideas within a statistical framework were grist for the mill in the thinking of Nekrasov; but hardly acceptable to Marxist ideologues such as Kolman; or even mathematicians such as Markov, who regarded Nekrasov’s activities as an abuse of mathematics.

There were repeated clashes between Markov and Nekrasov on quasi-mathematical grounds. Markov published a famous book on the calculus of probabilities, whose second edition Markov [1908] was translated into German as Markoff [1912]. The definitive version was the [1913] edition, timed to coincide with the 200th anniversary of the WLLN; there was a 4th (posthumous) edition of [1924]. Generally speaking it is what is now called a frequentist treatment of probability. It is critical of Bayes’ Theorem as a tool for incorporating degrees of belief into analysis of experimental evidence.

At about the same time Nekrasov's [1912] book with similar title appeared. The second part of it had been a text for Moscow University students; the first part is heavily ideological on matters of religious faith, autocracy, and capitalism. It is heavily Bayesian, seeking to interpret statistical regularity as evidence of Devine action. Nekrasov [1916, 16–19] (see also Orlov [1933, 26]) criticizes Markov's book as Marxist,

deliberately removing all traces of teaching about higher justice, for example the mathematical doctrine of moral expectation.

Some technical explanation of the background to Bayes' Theorem is necessary here, inasmuch as its use in incorporating degrees of belief is a key issue in the Marxist criticism of Bayesian reasoning in statistical inference. The theorem of inverse probability, or Bayes' Theorem, named after the Rev. Thomas Bayes (1701–1761), and published posthumously by Richard Price in 1764, is a mathematically elementary deduction about conditional probabilities: if A_1, A_2, \dots, A_n is a set of mutually exclusive and exhaustive events, and B is any event, then

$$P(A_i|B) = \frac{P(B|A_i)P(A_i)}{\sum_{j=1}^n P(B|A_j)P(A_j)}, \quad i = 1, \dots, n. \quad (4.2)$$

Thus Bayes' Theorem permits modification (or updating) of a *prior probability* $P(A_i)$ of an event A_i to a *posterior probability* $P(A_i|B)$ on the basis of observed evidence B by use of a multiplication factor.

The frequentist approach to statistical inference insists on probabilities having an interpretation as limits of relative frequencies in the framework of the WLLN, in the framework of conceptual repetitions of the sampling experiment in the presence of error influences. Where the Bayesian approach differs is that in general the $P(A_j)$'s are not probabilities in this sense but express degrees of belief, so the results of the inference process do not have a clear frequentist interpretation in terms of conceptual repetitions. The dichotomy between frequentist and Bayesian inference continues to this day among statisticians. Historically in the great seminal work on probability and mathematical statistics of Laplace, *Théorie analytique des probabilités* of 1812, Bayesian methods of statistical inference were the only inferential methods available and gained great impetus, even though Laplace was an "objectivist" rather than a "subjectivist" (that is, not given to incorporating degrees of belief into mathematical analysis of statistical evidence). Laplace used the Principle of Insufficient Reason to express ignorance about the prior probability weights to be allocated to the events A_i , taking all to be equiprobable, which renders the expression (4.2)

$$P(A_i|B) = \frac{P(B|A_i)}{\sum_{j=1}^n P(B|A_j)}.$$

In the situation of "continuous" probabilities where inference is to be made about a parameter θ , it is treated as a random variable Θ , whose prior density is "uniform," so that its posterior density on the basis of experimental evidence \mathbf{x} is

$$f(\theta|\mathbf{x}) = \frac{f(\mathbf{x}|\theta)}{\int f(\mathbf{x}|\theta) d\theta}.$$

(See Hald [1998], Chapter 15: Laplace's Theory of Statistical Prediction.) Laplace's methods of inference were brought to St. Petersburg from France by M.V. Ostrogradsky (1801–1802) and V.Ya. Buniakovsky (1804–1889) (see Seneta [1998b]). Indeed Buniakovsky in 1846 published a Russian treatise whose

title in English translation is *Foundations of the Mathematical Theory of Probabilities*, very much in the spirit of Laplace’s treatise. Bayesianity and religious themes are present in it because a link between Bayesianity and incorporation of religious belief easily suggested itself to the believer. Although Buniakovsky is thought of as a predecessor of (and a mentor of) Chebyshev, there is little evidence of Bayesianity in the probabilistic work of Chebyshev, Markov, or Liapunov; and indeed Buniakovsky’s use of “Bayes” came in for strong criticism by Markov in Markov’s book (see our [Section 7](#)).

Buniakovsky’s book served as an influence on Nekrasov and a seed for vilification by Marxist ideologues. The St. Petersburg School was seen as essentially politically correct and its probabilistic work lauded; whereas there was good reason to consign the Moscow School, and in particular Nekrasov (bourgeois, mystical, reactionary), to the dustbin of history.

A more extensive discussion of [Nekrasov’s \[1902\]](#) book and its sequels in relation to Quetelet, statistical regularity and free will, in the philosophical context of the times, is contained in a companion paper to this one [[Seneta, 2003](#)].

5. Politically correct probability

We have made the point that probability as a branch of mathematics was particularly susceptible to ideological attack, on the one hand because of its resemblance to physics in the modelling of statistical reality, such as formalizing statistical regularity, and indeed because of its use in nondeterministic physics, and on the other hand on account of its capability for incorporating degrees of belief through Bayes’ Theorem to influence the interpretation of experimental outcomes. The axiomatization of probability which made it properly a branch of pure mathematics is due to [Kolmogorov \[1933\]](#). This axiomatization occurs right in the middle of the time of the ideological attacks on mathematics and genetics, but the ideological attacks on probability are not directed, as they generally were in mathematics by Marxist ideologues, against axiomatic formalization.

[Kolman \[1926\]](#) from the beginning accepts as his view on randomness and determinism the position formulated by Engels in his *Dialectic of Nature*, which argues for randomness being a manifestation of essential determinism. Somewhat later, without deviating from Engels as foundation, he admits [[Kolman, 1934, 74](#)] that even his own earlier writings, and those of his ideological colleagues—Marxist leaders in mathematical statistics—Khotimsky and Yastremsky were clouded by needless philosophizing on the topic of probability (defined as “measure of objective possibility” and a random process as a probabilistic “abstract model”), which neglected to use the “more perfect means of the theory of sets.” This is apparently in recognition of the methodology of Kolmogorov’s axiomatization. Nevertheless, [Kolman \[1934, 75\]](#) continues, it is understandable what great significance an attempt to construct probability theory on the basis of dialectical materialism has. Such an attempt by Struik, in Russian, follows Kolman’s article. Kolman describes Struik’s article as

By its content . . . directed equally against idealism as against mechanistic denial of statistical regularity, although in the work itself these aspects are not specifically pointed out.

[Kolman \[1934\]](#) then goes on to attack [Nekrasov’s \[1912\]](#) book in that it not only exposit mathematical theory, but purports to show how this gives credence to solution of social problems of the time, in

particular by tsarist centralized management of finances and labor, as manifestations of Divine Order. He concludes:

And although all these fantasies are today seen as deep medievalism, one should not forget that not so long ago statistical theories were used as a means of economic wrecking, and deeply thoughtful works ... were published ... by people who had once passed through the full course on the theory of probabilities of this same P.A. Nekrasov.

We shall return to the allusion to “economic wrecking” below. The identification of probability, Nekrasov, and the Divine Order served as a fruitful tool in Kolman’s ideological attacks; but any attack on the axiomatic theory of probability had needed to be left to mathematicians, and we may thus look to [Struik \[1934b\]](#), to which [Kolman \[1934\]](#) is an introduction, for a theory of probability according with Marxist dialectics. Struik’s article is an expanded version, with dialectical materialist coloration,⁷ of an article in English [[Struik, 1934a](#)] in the American journal *Philosophy of Science*. This journal, the “Official Journal of the Philosophy of Science Association,” began publication in January 1934, under the editorship of William Marias Malisoff, who was its editor till October, 1934. [Struik \[1934a\]](#) is more measured in tone, with fewer sections, shorter, and written earlier.

[Struik \[1934b, Section 1, 77\]](#) asserts that from a dialectical materialist standpoint, no subjectivist (i.e., degree-of-belief-influenced) theory of probability, which he ascribes to Laplace and also to the modern theory (of the time) of quantum mechanics where the presence of the observer is said to affect the results, is acceptable. [Section 1](#) is not present in [Struik \[1934a\]](#). As we have noted in our previous section, Laplace certainly uses “Bayesian” arguments to express ignorance, but, we would argue, as a means to statistical inference, no “frequentist” technology for inference being available at the time. Another concept which Struik says is inappropriate from the dialectical standpoint is the separation of probabilistic events from all others, that is to say, from events which are an effect from a cause. Here Struik mentions Laplace’s deterministic standpoint as perceptive, but defective in not providing a “rational” definition of probability, and then goes on to Engels’s reconciliation of the random and the deterministic. Perhaps the clearest statement of what dialectical materialism requires of a theory of probability is that it be

... a physical theory, and not a subjective theory, and a theory in which one investigates the relationship between causal and random events. Together with this, one requires a fully perfected mathematical theory, and above all a precise definition of fundamental concepts. [[Struik, 1934b, 78](#)]

He goes on to describe the *mathematical* aspect, introduced by Borel, as being at the foundations of Kolmogorov’s [at that time new] book [of 1933]. The appropriate *physical* principle, which is more elusive, he says was explicitly formulated by Hegel and Engels, but as a foundation for mathematical theory is contained in the writings of Smoluchowski (“by randomness we understand special kinds of causal relations”).

In all, there is little in Struik’s article that a modern mathematical statistician of the frequentist type would argue with. The object of the attack is what one might term Bayesian statistics. Although neither book is mentioned in Struik’s article, the dichotomy here is between Markov’s textbook [[1908, 1913, 1924](#)] exposition of probability and [Nekrasov’s \[1912\]](#). The Bayesian standpoint, particularly when

⁷ Including statements such as (p. 82) “The lack of understanding of this internal association is one of the fundamental causes of why the application of the theory of probabilities to economics by bourgeois economists is unsuccessful,” to which end he cites (p. 83) the “Russian Whiteguardists P.A. Sorokin and N.N. Golovin.”

mixed with “fideism” and “natural order” as in Nekrasov, provide a natural Marxist ground for attack on the “old order” of mathematicians and philosophers as “class enemies” in the brave new world of the proletariat.

It is appropriate to mention that a little earlier, Kolman, in an article entitled *The present crisis in mathematics*, attempting a grand sweep of mathematical thinking in the hands of inadequate mathematical metaphysicians [Kolman, 1931, 205], turns to results inexplicable by them in probability—for example, why the value of π may be determined by the number of line crossings in Buffon’s needle experiment [Kolman, 1931, 206–207]. That the value of π comes out “correctly” is a consequence of a correctly formulated frequentist probability model; but the understanding of this requires more understanding of probability than was available at the time to Kolman. The issue has nothing to do with “degrees of belief,” but might have been interpreted as inadequacy in the mathematical metaphysicians in not supplying a rational causal basis for the statistical phenomenon as, according to Struik, dialectical materialism required.

6. Politically correct statistics?

Kolman [1934] mentions in his lead-in to Struik’s [1934b] article the statisticians Khotimsky and Yastremsky. Mathematical statistics, the science of quantitative inference on the basis of data obtained as a “random” sample, requires probability theory as its basis. Inasmuch as inferences are made about real structures underlying data, conclusions drawn may be politically sensitive, and criticism of incorrect statistical analysis of the data may be leveled for political reasons, and ascribed, as in the U.S.S.R. of the 1920s and 1930s, to intentional wrecking [*vreditel’s tvo*]. Statistics as a science was therefore doubly vulnerable in the Stalinist years, and in effect as an objective science was destroyed in the U.S.S.R. in the late 1920s. For a brief treatment relevant to this section, see Seneta [1985]. Probability, in the guise of a branch of pure mathematics and under the protection of the influence and world renown of Kolmogorov, survived, and indeed thrived, but essentially separated from mathematical statistics, apart from a few valiant efforts at statistical application involving Kolmogorov (e.g., Kolmogoroff [1933], and V.I. Romanovsky (1879–1954), who was physically isolated in Tashkent (see Bogoliubov and Matvievskaia [1997])).

There was thus an obvious need in the Stalinist economy for an ideologically correct textbook on mathematical statistics. A second edition of a book by Boiarsky, Starovsky, Khotimsky, and Yastremsky appeared in [1931]. It contains the long ideological preface to the first edition dated 25/VII/1930. The long ideological preface to the second edition is dated 25/IX/1931 and mentions Kolman and Brand as respective (positive) reviewers of the first edition in *Pravda* (23 March, 1931, No. 81 (4886)) and *Planovoe Khozaistvo* (No. 4, 1931). It was at about this time that the functions of the scholarly *Vestnik Statistiki* [*Messenger of Statistics*] had been taken over by the politically correct *Planovoe Khozaistvo* [*Planned Economy*]. Brand figures among the authors of subsequent versions (which we do not enumerate) of this book under the continuing editorship of the leading Marxist statisticians, Yastremsky and Khotimsky, under the auspices of the Communist Academy as leaders of a “brigade,” in the Communist manner of the times, who were charged with carrying out the task. These subsequent versions take into account Kolman’s advice to extend the content of the book to a course in economic statistics, and to a course of the theory of economic calculation, and would have as their focal point

... the questions of the theory of socialist computations, arising primarily from the planning of the economy of the U.S.S.R.

The book of 1931, apart from fiery diatribes against statistical wreckers, in its theoretical discussion—generally speaking—is just a treatment of statistical theory from an essentially modern standpoint, with relative frequency regarded as experimental reflection of probability.⁸

What is important is Kolman's role in concert with Yastremsky and Khotimsky in the demise of Soviet statistics and statisticians in the name of Marxism and dialectical materialism. These attacks, to be effective, could only be construed as attacks on politically unacceptable *statistical analysis* of data, and not on *statistical theory*.

To pursue the statistical aspect further here would take us too far afield; some information is available in [Joravsky \[1961\]](#) and [Seneta \[1985\]](#). However, as regards the above Marxist statisticians, [Kolman \[1982b, 132\]](#) in his biography mentions a grotesque development, especially referring to Khotimsky:

Still in 1931 statistical charlatans, whom we had criticized, in an anonymous denunciation, “exposed” him and the whole group of Marxist statisticians headed by him (which included Yastremsky, Boiarsky and Starovsky) as *belopoliaky*.

The basis was that all their names ended in “. . .sky,” a common Polish ending. The word *belopoliaky* means White Poles with “White” contrasted with “Red,” that is, in the sense of the régime in the then Poland, which the Reds described as fascist. This denunciation was initially laughed off by the *vlastimuschi* (powers that be), but in 1933 Khotimsky was moved, presumably from the Communist Academy, to an obscure political post and in the hysteria of the purges (*Yezhovschina*) of 1937, as we have noted in [Section 3](#), he was arrested and liquidated. Boris Sergeevich Yastremsky, the oldest of the four (born in 1877) lived to a ripe old age, ingratiating himself with [\[Yastremsky, 1953\]](#) and outliving Stalin, and still publishing vitriolic articles attacking bourgeois statisticians in 1957 [\[Yastremsky, 1957\]](#).

7. Orlov, religion, and mathematics

We have attempted to establish the threads of the argument that Kolman's line of attack on mathematics, in general, availed itself of the platform of dialectically incorrect probability, especially of Bayesian probability as exemplified by Nekrasov's writings in its application to the question of “Divine Order” in Imperial Russia. Kolman's target was broader than what might be termed probabilists and included Egorov and Luzin. His attacks in general were facilitated by the strong hold which Christianity, in the form of the Russian Orthodox Church, continued to exert on a broad cross-section of the then society. This has been described by [Ford \[1991\]](#) especially as an aspect of the destruction of the Moscow Mathematical Society. We have extended that account (in our [Sections 2 and 3](#)) by tracing this ideological thread to Kaganovich's speech at the 16th Party Congress.

In this section we fill out the scope and nature of the attack on the basis of religion through [Kolman \[1929\]](#), the booklet by [Orlov \[1933\]](#), and the article by [Kolman \[1933\]](#), which are closely linked, and in which Nekrasov's religion and probability play a leading role. No doubt Kolman was pleased to find in

⁸ The frequentist theory of probability of von Mises, with its ideological overtones, on the other hand, was criticized by the eminent Russian probabilist A. Ya. Khinchin (1894–1959). [Struik \[1934b, 79\]](#) speaks of the “typically non-dialectical, metaphysical theory of von Mises.”

Orlov at the 16th Congress an ideological disciple to continue the ideological mathematical cleansing in Ukraine, and specifically Kharkiv (Kharkov) and Kyiv (Kiev), which he himself was doing in Moscow. Kolman [1933] describes Orlov [1933] as “the first swallow” in revealing the use of mathematics as a cover for religion, which in turn leads to the exploitation of the masses. At the height of his administrative career in Kharkiv, Orlov [1933, 45] does not fail to mention Kolman’s [1929] blistering review on the religious aspects of Bogomolov’s [1928] book, mentioned in our Section 2.

Orlov [1932] had already shown his ideological worth by devoting Chapter XIV of *Inzhenerna Matematyka*, Part 2, to *Dialectical Materialism and Mathematics* (pp. 252–260). Insofar as the dialectical materialist position can be made clear by a mathematician, this chapter is a clear account. We confine ourselves to a translation of the Section headings:

- §113. On the fundamental laws of materialist dialectic.
- §114. Lenin and materialistic dialectic in nature.
- §115. Materialistic dialectic in mathematics.
- §116. The axiomatic method in mathematics.
- §117. Intuitionism.
- §118. The mechanists.
- §119. The menshevikist idealism, destructiveness and party line in mathematics.

Here §119 mentions an article of Kolman in *Bolshevik* for the year 1931. §116 contains the obligatory attack on David Hilbert; and herein lies a curiosity. Russian has no letter “h”; the letter “h” in Ukrainian reads as the hard “g” in Russian; Ukrainian has (or had at the time) a separate letter for the hard “g.” In Russian, “Hilbert” reads as “Gilbert”; in Ukrainian the identically printed word reads “Hilbert.” Orlov, in spite of his excellent Ukrainian writing, repeatedly in proper names makes the letter which reads as “G” in Russian into the (morphologically different) letter “G” in Ukrainian, so in Orlov’s Ukrainian, too, the name David Hilbert spells and reads repeatedly as David Gilbert. One wonders rather as to the breadth of Orlov’s knowledge of foreign mathematics, or whether he was just repeating, by name, Moscow’s denunciations of various ideological undesirables.

In spite of his drive and enthusiasm for Marxism, it is evident that Orlov’s very pronounced Ukrainian linguistic orientation served as one pretext for his liquidation (Appendix B).

The ideological grounds for the attack on the use of mathematics in support of religion in Orlov’s book are clear from the outset, in dicta on religion from Lenin’s *Materialism and Empiriocriticism* and Engels’ *Anti-Dühring*. Orlov [1933, §1] states:

Religion is now an inseparable part of the bourgeois apparatus for the repression of the masses ... Amongst other sciences, mathematics is also used by “representatives of the enlightened bourgeoisie” to strengthen their ideological positions ... This is why the exposure of such arch-reactionary attempts is of great importance in the general battle of the proletariat against capitalism.

He makes the point how certain mystical tendencies in the work of some mathematicians directly support religion, by quoting⁹ from Engels’ *Dialectic of Nature*:

Ordinary mathematicians of a metaphysical bent continue unabated arrogantly to pronounce on the absolute truth of the results of their work. But in these results are contained also the imaginary numbers, which thus acquire certain reality. In fact, it is enough to

⁹ We give here a free translation from Orlov’s Ukrainian, since this may be more apropos than from his Russian source, or its German original.

get used to giving $\sqrt{-1}$, or the 4th dimension, a reality beyond our understanding, to be emboldened to take a further step and give reality to the spiritual world of mediums.

Thus to put Orlov's standpoint simplistically: religion is evil and to be suppressed; and there is a tendency among some mathematicians to associate mystical ideas with certain mathematical constructs and tools which support religion. This lends itself to the facile extrapolation that mathematics is contaminated by ideology antagonistic to Marxism, and mathematicians should be the subject of purging. The specific areas of mathematics singled out as suffering from these mystical tendencies in Orlov's booklet are probability and geometry. Orlov concludes his introductory ideological sections with: §5. The Marxist–Leninist Understanding of Mathematics. This is founded on Engels' *Anti-Dühring*. The main points seem to be (at least in Orlov's presentation) that abstraction in mathematics has a role only in the context of revealing real-world phenomena: essentially as a mathematical model which focuses on the essence. In its history, mathematics has always been driven by the materialist needs of the real world, and there is no room for mysticism in it. The bourgeois tendency to use mathematics in religion, in Orlov's thinking, must be destroyed. Even Newton, through the use of his religious writings by the “diplomated lackeys of [Russian Orthodox] popistry,” comes in for criticism for his “tribute” to the class interests of the ruling class [Orlov, 1933, §6].

The focus of the attack is Buniakovsky's [1846] use of Bayesian methods in the context of the testimony of witnesses affecting the probabilities of unlikely events in the remote past, and thus using probability mathematics in support of religion. Buniakovsky, a Russian disciple of the French mathematical school, thought of himself as the Russian Laplace in regard to probability, and his book of 1846 is, accordingly, effectively the first monograph in Russian on the subject, seeking to parallel Laplace's *Théorie analytique . . .* by which it is heavily influenced and to which it expresses specific indebtedness. Laplace's treatment was (as we have noted in Section 4) heavily Bayesian but Laplace, a determinist, had no need, as he said, of the hypothesis of the existence of God, and when he approaches questions such as Pascal's *Le pari* [*The Wager*] which do allow the possibility of eternal life, he does so with scepticism. Buniakovsky, on the other hand, held traditional religious beliefs in conjunction with his scientific rigor. He writes for example [Buniakovsky, 1846, 326]:

Some philosophers, with malign intent, tried to use formulae to weaken probabilities of testimonies and oral traditions, of religious beliefs, and thus to shake them. To reject their conclusions we need to recognize that any consequence of an analytical formula can only be an amplification of the initial assumptions on which the formula is based. If the assumptions are false, the consequences of the subsequent analysis will be false. Thus we must subject the initial assumptions to fundamental scrutiny. When this examination leads us to the conclusion that in the spiritual world there are phenomena which do not accord with physical laws, then the ill-intentioned reasoning of false philosophers will collapse.

Laplace's scepticism about religious issues sets Laplace and Buniakovsky conveniently apart, and permits an unimpeded attack on Buniakovsky on religious grounds.

Here is the essence of one of Buniakovsky's Bayesian arguments which were to lead to Markov's stinging criticisms.

Suppose an (perhaps historically remote) event (one may think of a miracle) A_1 has small probability $\varepsilon > 0$, so $P(A_1) = \varepsilon$, and A_2 is the complementary event, so that $P(A_2) = 1 - \varepsilon$. Suppose that B is the event that m witnesses testify that the event occurred, and each witness has, independent of the others, a propensity $1 - \delta$ to tell the truth, so that $P(B|A_1) = (1 - \delta)^m$, $P(B|A_2) = \delta^m$. Then applying Bayes'

Theorem (4.2) with $i = 1$ and $n = 2$

$$P(A_1|B) = \frac{(1 - \delta)^m \varepsilon}{(1 - \delta)^m \varepsilon + \delta^m (1 - \varepsilon)} = \frac{1}{1 + \left(\frac{\delta}{1 - \delta}\right)^m \frac{1 - \varepsilon}{\varepsilon}}.$$

Now, if $(1 - \delta) > 1/2$, $P(A_1|B)$ approaches 1 as m becomes large, and the approach is rapid. Thus, even with $\delta = 0.1$, $m = 2$, and $\varepsilon = 0.01$, $P(A_1) = 0.01$ is “updated” to $P(A_1|B) = 0.45$.

Orlov [1933, 19] cites Nekrasov describing Buniakovsky as pronouncing

... words which apply to belief and traditions of community and religious character, and delineate the traits of the face and genius of the most civilized races ...

and establishes thereby a direct link between Buniakovsky and the pre-Revolutionary Nekrasovites (*Nekrasovtzi*), as listed by Nekrasov himself (V. Ya. Tsinger, N. V. Bugaiev, P. A. Nekrasov, V. G. Alekseev, P. S. Florov, “and others”)—that is to say, with the Moscow Mathematical School, in ideological contraposition to which he puts the St. Petersburg School, with A. A. Markov as prime opponent of Nekrasov, and Markov’s textbook as the authority against Buniakovsky’s religious-leaning misuse of Bayesian arguments. We have described the antagonism in general terms in our [Sections 3 and 4](#).

Orlov’s sustained attack (e.g., [Orlov \[1933, 20–23\]](#)) bears heavily on Nekrasov’s repeated attacks (e.g., [Nekrasov \[1912, xxxvi\]](#)) on Marx’s theory, on Markov’s “materialist” treatment of probability in his textbook, on Nekrasov’s ideological introduction (of 36 p.) to his own 1912 textbook *Teoriia Veroiatnostei*, where the 532 pages of text are said (an exaggeration) to propagate the themes of autocracy and Orthodox Christianity, and not least on [Nekrasov’s \[1902\]](#) insistence, in contrast to Marxist determinism, on “free will.” Orlov concludes his §11. Nekrasov’s “Bible” [Nekrasov’s ka “Bibliia”]—this is Orlov’s disparaging title for [Nekrasov’s \[1912\]](#) book paralleling the usual name, bible, for the Holy Scriptures of Christianity—with:

In §32 of his “bible”, ... Nekrasov [speaks] of posterior probabilities, but no mathematical manipulations give the least occasion to speak of “god” on the basis of Bayes’ Theorem.

Markov’s position in his book on Buniakovsky’s application of mathematics in the above context—that such questions are not properly in the realm of mathematics—is quite measured. However, being of volatile nature (see [Ondar \[1981\]](#), for the preface by J. Neyman “*Andrei the Terrible*”), he tends to exaggerate, saying that he saw little significance in the “formulae used” by Buniakovsky. His ill-chosen volatility well served the Marxism of ideologues like Orlov, who were not about to recognize that it was sometimes in considerable error. For example, when Chuprov introduced Markov to the application of probability in the statistical work of Karl Pearson’s English Biometric School, Markov initially dismissed that as of no significance [[Ondar, 1981](#)]. Pearson’s own statistical work was not favored by the Marxist philosophers such as Kolman and came in for repeated collateral attack. It is not unconnected that Pearson had been a philosopher of science before becoming a mathematical statistician and [[Porter, 1999, 402](#)] was

... very sympathetic to Catholicism ... [which] he viewed as a religion of tradition, ritual and feeling, and hence less prone to contradict the truths of science than a religion supposedly grounded in reason.

8. Orlov and Kolman on religion and mathematics

Orlov proceeds to build on the theme in his §12. Nekrasovites Before and After the Revolution, by attacking the writings of the founder, Bugaiev, of the Moscow Mathematical Society, and in §13. “Course of Probability Theory” of L.K. Lakhtin. This book of Lakhtin, published in 1924, is attacked on the grounds of its unacceptable interpretation of randomness (a topic close to the heart of Kolman), and its extensive treatment of the unacceptable topic of “moral expectation” was a point of contention between Markov and Nekrasov, which Orlov sees as a continuation of the “fideistic direction of mathematics,” renewing his attack on Nekrasov’s ideology.

Probability is no longer the subject in the following section: §14. Bogomolov—Ideological Descendant of Nekrasov. Here Orlov picks up from Kolman’s [1929] “review” of Bogomolov’s [1928] book which we have mentioned in our Section 2, and tries to work it into his scheme of Nekrasovite descent—even though the book is on geometry—through its mystical leanings. Perhaps not wishing to steal Kolman’s proprietorship in this respect, Orlov [1933, 45] says:

As in other instances, we do not give an extensive critique of the views of this or that mathematician, because our aim is narrower—to expose only the means by which mathematicians try to serve religion.

He does broaden his attack beyond the book by attacking earlier writings of Bogomolov who sees connections between mathematics and music, and mathematics and aesthetics. God forbid, says Orlov of Bogomolov,¹⁰ that mathematics should be of use in socialist construction. The section concludes (note that Orlov’s booklet was published in 1933) with the sentence

Justice makes it incumbent on us to say that lately Bogomolov has admitted the error of his views.

But this is not enough to satisfy Kolman [1933], as we show below.

§15. Nekrasovite–Bogomolovite Associates, is the last section to relate to the Russian scene before Orlov passes on to the West. First to be attacked is A.V. Vasiliev for indulging in numerical mysticism in a book of 1919. Vasiliev was actually a friend of Markov (who died in 1922) and had facilitated the publication of Markov’s first paper on Markov chains in 1907 in the journal of the Mathematical Society at Kazan University. This paper as we have noted was driven by Nekrasov’s incorrect assertion about the WLLN for dependent random variables. Vasiliev had also shepherded through other probabilistic publications from before the revolution, some from the several polemical wars between Markov and Nekrasov. These may be found in Markov [1951]. This kind of attack by Orlov would therefore seem to have been rather misjudged in more normal times.

More to the point in the same §15 are attacks on newly discovered deviationist writings: Florensky’s [1922] *Mnimosti v geometric* [*The Imaginary in Geometry*] and Losev’s [1927] *Antichnii kosmos i sovremennaia nauka* [*The Ancient Cosmos and Contemporary Science*]. Florensky is said to propose that in four dimensional space there is a direction by which, from our sinful world, one may immediately pass to hell, citing Dante’s excursion there as described in the “Divine Comedy.”

¹⁰ Bogomolov’s name, which literally means “God-praying,” in itself might have invited Marxist attention in the same way as the “-sky” name-ending of the misappropriately called “White Poles” (see Section 6), in the hysteria of the time.

The curiously brief treatment of Losev and Florensky did not satisfy Kolman [1933, 91], who describes Orlov's treatment as extremely concise (*kraino szhata*), and needing to be translated into Russian, with some complements (*s nebolshimi dopolneniiami*). Kolman's article, which is in the *Kritika i Bibliografia* section of the journal *Bolshevik*, provides these *dopolneniia* by mounting a fierce supplementary attack on Florensky and Losev, Bogomolov having been disposed of in his earlier [Kolman, 1929] article, which has already been followed up by Orlov [1933]. Kolman was in an excellent position to translate Orlov's [1933] booklet himself from Ukrainian, with which he claims familiarity in his autobiography, having spent time in Ukraine in 1932 (see our Section 2) reading classics of Ukrainian literature when not purging and window-shopping in Kyiv during the famine. Kolman's [1933] critique, however, has additional targets within the context of the battle between science and religion, first of all the Roman Catholic Church, setting the scene with reference to the Inquisition¹¹ and Galileo, with the Church supporting the Ptolemaic system of the world. He says [Kolman, 1933]

It exploited science itself against science in its own interests and the interests of the exploiting classes

and describes it colorfully [Kolman, 1933, 88] as

... the [masked] religious viper in the saccharine robes of "scientific" and philosophical systems.

The primary target within the Church is Pope Pius XI who

... calls not only for Crusades against the land of the Soviets, but also actively supports the interventionist plans of German fascism ... and turns to scientists of the Christian world—to place the achievements of science at the disposition of the battle against pernicious materialism.

In question here is a papal communication of 1932.¹² It seems likely that Kolman, as leading materialist philosopher of the Soviet Union, was called on to provide some kind of response to events related to the Wall Street crash¹³ and the rise of Hitler in 1933, and uses his article, cleverly interwoven with attacks on Russian religion in the name of science, to do so. At the same time this opportunity provides a platform to press home the attack on certain Russian mathematicians. The antireligious theme is developed further by attacking certain U.S. universities (Struik was then at MIT):

There exist tens of universities in the nature of Brown University which focus their attention on the coherence of science and religion. From the XVII c. there have been specific Funds (like the Gifford, the Sulliman [?], and others) for scientific-popular lectures ... which on the basis of science prove the necessity of religion and the wisdom of the Creator.

¹¹ There is a footnote (p. 88) on the location of Galileo's retraction (22 June, 1633), the church Santa Maria sopra Minerva. This reads "St. Maria above Minerva (Minerva—the ancient goddess of wisdom, science)—the name of the church itself is sufficiently illuminating."

¹² Kolman cites a passage from *Acta Apostolicade [sic] Sedis*, 1932, pp. 14–15. Neither of the two encyclicals of Pius XI of 1932: *Caritate Christi Compulsi* (3 May), and *Acerba Animi* (29 September) contains the passage, which may have occurred elsewhere in this same annual collection *Acta Apostolicae Sedis*, Vol. XXIV, 1932. The author has seen only the encyclicals.

¹³ Kolman refers repeatedly to the "worldwide economic crisis." The encyclical of Pius XI: *Nova Impendet [On the Economic Crisis]* (2 October, 1931) calls for a Crusade of Charity and prayer for all those suffering the effects of the Great Depression with the onset of winter.

The question of mathematics in support of religion had now been transformed by Kolman into one of actual threat to Soviet society by the Christian U.S. and Europe. He is most critical of the great German physicist Max Planck, and uses him as an example of how the world economic crisis engendered peaceful coexistence between science and religion. Planck he says was a committed fighter against idealism and Machism, and for materialism, in physics. Came the difficult winter of 1931 to Germany, and one finds Planck, in a Christmas feuilleton published in the *Berliner Tageblatt*, defending coexistence of science and religion. He cites extensively from a 1933 philosophical article of Planck in which Planck's version of determinism is contrasted with Laplace's view about not needing the hypothesis of the existence of God (expressed to Napoleon), and cites the greeting of the Kaiser-Wilhelm Society (Planck was president) of 1933 to Hitler offering German science in the construction of the new national state. (Kolman does not elaborate on those parallels between Laplace–Planck and Napoleon–Hitler which would be detrimental to his argument.) He concludes with describing Planck as not only giving foundation to God's existence, but confirming all the more important dogmata of the Christian catachesis directly along the lines of the Nicene Creed, of which Kolman [1933, 91] quotes the beginning. With this, the foundation for extending Orlov's attack on Russian mathematicians is laid, which he begins with a quotation from Lenin, followed by brief summary and review of Orlov's booklet.

The attack on Florensky [Kolman, 1933, 92] begins with an attack on an article [Florensky, 1932] entitled *Fizika na sluzhbe matematiki* [*Physics in the Service of Mathematics*] in the journal *Sotsialisticheskaiia Rekonstruktsiia i Nauka* (SORENA) published by State organs. (This is very reminiscent of the attack by Kaganovich on Losev—see our Section 2—which carries a veiled attack on State organs for being insufficiently vigilant in what they published.) The attack is on Florensky's "intuitionism"; Florensky writes and Kolman quotes:

... "pure" logic has intuitive roots, without which it would be foreign to us ... The whole aggregate of mathematical knowledge depends on intuition ...

Clearly, Orlov's [1933] article stimulated Kolman's vigilance as regards Florensky, whose publication in a socialist journal, and the context of mathematics and physics, offered a prime target and led Kolman to investigate Florensky's writings more thoroughly. Kolman proceeds to list some of these, most of which are strongly religious, and published from the Russian Orthodox monastery at Sergeev Posad. Among these publications is, inevitably, *Stolp i Utverzhdenie Istiny* [*The Pillar and Foundation of Truth*], a major work published in Moscow in 1914, but not republished in Russia [Florensky, 1990] till the demise of the Soviet Union, although émigré editions existed (a French translation was published in Lausanne [Florenskii, 1975]).¹⁴

After dealing with Florensky's overtly religious publications, Kolman [1933] perceives a change of focus by Florensky to a more scientific direction under the prevailing ideological "winds of change." First he mounts a heavy attack on Florensky's [1922] *Mnimost' v geometrii* [*The Imaginary in Geometry*] as an illustration of Florensky's intuition. Orlov [1933] had used this very book to criticize Losev extensively; Kolman goes further by citing, in Russian rhyming and metric translation, the very passage from Dante ("Hades," Canto XXIII), with Florensky's commentary. Kolman sees in this and further comments of Florensky a refutation of Galileo's world system and support for the Ptolemaic (with the world at the center of the universe). Indeed Florensky's astronomy tends at least superficially to the religious. He

¹⁴ There is a recent English translation [Florensky, 1997].

calculates that according to the Ptolemaic system the boundary between the earth and the heavens as “26.5 times as far from the earth as the sun,” thus “between the orbits of Uranus and Neptune,” and says

On the boundary of the Earth and Heaven, the length of every body becomes zero, and the mass infinite, and its time . . . infinite.

These Ptolemaic views of Florensky were out in the open in 1922; in 1932 in the article in SORENA, Kolman says these views are only delicately masked, and yet they appear in a journal established by special decree of the Central Committee of the Communist Party (Bolsheviki)! The editors were not able, he says, to digest Florensky properly; some editors of socialist journals reveal vigilance “not worth a penny,” and provide a tribune for the propagation of idealism. Florensky is not the only scholar to propagate idealism: Kolman names Vernadsky, Frankel’, Gamow, etc. The lack of vigilance, he says, was brilliantly understood by the leader [*vozhd*] of truly Russian idealism, A.F. Losev; and he turns (as did Orlov [1933]) to Losev’s [1927] book. The subject is Losev’s assertion that all Platonism is contained in the Lorentz contraction formula for length,

$$\beta = \sqrt{1 - \frac{v^2}{c^2}}.$$

When

v is greater than c we obtain an imaginary length, time flowing in reverse, and imaginary mass. This means that a body collapses within itself. . . . This we may understand as an exit from the cosmos . . .

These early naive attempts to interpret the theory of relativity by the intensely religious invited attacks by Marxist ideologues. No less naive, damaging to Soviet science, and destructive to the fabric of society, was to perceive naively, as the Marxist philosopher Kolman does in the light of Stalin’s teachings, such people as threatening ideological enemies. Kolman [1933, 95] says:

The class struggle assumes at this stage of socialist construction specific form. Comrade Stalin gave with exhaustive completeness an analysis of the resistance of the class enemy with all his cunningly masked devices. Mistaken is he who assumes that the class enemy is only the kulak and the servant of the kulak, that he takes only the form of the accountant, agitating for quitting the collective farm; mistaken is he who does not understand that the class struggle persists on the ideological heights, who does not understand the analysis given by comrade Stalin . . .

We have spoken of Florensky in Section 3, as essentially a member of the Moscow Mathematical School. As a Russian Orthodox priest he never lost interest in mathematics, seeking in particular to unify contemporary mathematical concepts with theological ideas. His magnum opus, *Stolp i Utverzhdenie Istini*, is heavily mathematical; in particular it contains elements of symbolic logic and the set-theoretic ideas of Cantor. From this book it is clear that breadth and depth of his reading was enormous. As examples particularly relevant to this account, we note [Florensky, 1990, 640–641] concerning Pascal’s *Wager*:

Laplace’s discussion [*rassuzhdeniia*], and probably Craig’s, err on the deep misunderstanding of the infinite

and on the following page, in his notes on pragmatism, he notes foremost Karl Pearson’s [1900] *Grammar of Science*. Karl Pearson was one of the founders of the English Biometric School, the fount of the development of modern mathematical statistics.

Florensky had graduated from the Moscow Theological Academy in 1908 and was appointed to its faculty. The *Stolp i Utverzhdenie Istini* was his master's thesis; it was discussed in letters between Egorov and Luzin [Ford, 1991]. Florensky was ordained priest in 1911 and, as Kolman [1933] notes, was editor of the theological journal, *Bogoslovskii Vestnik*, of the Moscow Theological Academy at Sergeev Posad, 1911–1917. In spite of the Revolution and its immediate aftermath, the period up to the mid-1920s [Khoruzhy, 1990] was a period of great productivity for him, not only in the religious philosophical sphere, but in the sphere of mathematics and physics, in connection with technology and materials science. From 1921 he was instructor and director in the State Electricity Authority *Glavelektro* and in 1924 published a major work on dielectrics. Simultaneously he worked on his own theories in aesthetics, specifically the theory of reverse perspective in art. After the mid-twenties his activities were increasingly confined to the technical. In 1927 he invented a noncoagulating machine oil called dekanite [Papin, 1967]. In the summer of 1928 he was banished to Nizhny Novgorod (as were numerous dissidents of the Communist era since) but the restriction was lifted through the intercession of the wife of Maxim Gorky (Peshkov); Gorky had been defended by Markov against the Orthodox Church and tsarist regime and was in good standing with Stalin. Florensky continued throughout to wear his priestly robes with his pectoral cross. By the beginning of the 1930s, Khoruzhy [1990, ix] writes

... a campaign developed against him of pogrom and denunciation [donos].

Arrest followed on the 26 February 1933, and on the 26 July he was sentenced to 10 years imprisonment.

Eventually Florensky was sentenced to death on the 25 November 1937 by a three-man panel of the security organs of Leningrad oblast, and shot on the 8th December 1937. (The date of his death did not become known until the demise of the Soviet state; it had been reported variously, usually as 1943, due to hearsay.) He is now sometimes referred to as St. Pavel Florensky in the publications of the Russian Orthodox Church Abroad. He has not been, however, so recognized (“canonized”) by the Moscow Patriarchate. The whole of the US based: *Russian Studies in Philosophy*, Spring 2002, Vol. 40, No. 4 is devoted largely to his spiritual heritage, under the title: “The Florenskii Enigma.”

The date of Florensky's arrest in 1933, is close to the initial attack by Orlov [1933] and the coup de grâce by Kolman [1933]. Florensky, whose writings as philosopher, mathematician and physicist revealed a strong religious inclination, was an excellent target for Kolman, who perceived himself as a Marxist philosopher of science, especially of physics and mathematics. Florensky's arrest and death must be seen as one of the resounding successes of the campaign against mathematics on religious grounds by Marxist ideologues.

By the time of Florensky's death Kolman himself was in deep trouble [Kolman, 1982b, 196–197] through two of his Marxist relatives being executed. Khrushchev asked him to leave all Party activity, and his one serious attempt at exposition of advanced mathematics from Marxist positions, *Predmet i metod sovremennoi matematyki* [Kolman, 1936], was severely criticized on grounds of technical incompetence by Gelfond and Shnirelman [1938]. Kolman remained unemployed for most of a year, but eventually arose again. Orlov by the time of Florensky's death had been executed (on October 22, 1936; see our Appendix B). He is not mentioned in Kolman's published autobiographical memoirs, which as Demidov and Esakov [1999] also note, selectively omit a great deal.

Acknowledgments

I thank Charles E. Ford for motivating me to extend my studies of mathematics in the 19th-century Russian Empire; for providing me with much of the source material and preprints of his own work which has now appeared; and for his hospitality in 1999. My thanks for source materials and information are also due to Halyna Syta, Peter Jagers, Sergei Demidov, Werner Theuer of the Havemann-Gesellschaft, and two referees of this paper. Finally, I thank Alex and Frannie Weiss at whose home in Radford, VA, the bulk of this paper was prepared in February, 2000; and the Mathematics Department, University of Virginia, for its continued hospitality.

Appendix A. E. Kolman

Ernst (or Arnosht, Arnošt, or Arnost) Kolman was born on December 6, 1892, in Prague, of a Jewish mother and a Czech father, who traced his origin to Italy [Kolman, 1982b, 10–11], to the villages of Bolzano and Colmano. Kolman's maternal grandmother was a practicing Jew and his early schooling was in a religious setting. The dominant culture of Prague, as of the large cities of the Empire, was German, and there was a German University as well as the Czech Charles University. He was enormously influenced in his early years by his father, whose Czech revolutionary nationalism was linked to a militant antireligionism [Kolman, 1982b, 16], and who regarded the State Church (the Roman Catholic Church) as a support of worldly despotism of Empire. Both Vienna (the capital of Empire) and Rome (the nucleus of the Church) were equally loathsome. A further enormous blow to Ernst's sensitivities (p. 34) was his rejection by "the capitalists and functionary Aryan-pureblood German" parents of a girl friend, as a "half-caste, neither Czech nor Jew."

In accord with his father's wishes, having completed his "Matura" (Abitur, matriculation), at 17 he entered in 1910 the Polytechnic in Prague (Prager Tschechische Technische Hochschule), but simultaneously attended as an audit student the mathematical division of the philosophical faculty at the Charles University (Tschechischen Karls-Universität). He joined the student social-democrats in spring of 1910 and discovered Marxism. Shortly after the assassination of Archduke Franz Ferdinand, which led to the beginning of World War I, he was mobilized into the Austro-Hungarian Empire's army. Being a prisoner of war of the Russians (soon liberated by the onset of the Bolshevik revolution in Russia) gave vent to his own rampant Marxism and antireligionism and militant revolutionary activism. The parallels between the Austro-Hungarian Empire and its Roman Catholic Church, and the Russian Empire and its Russian Orthodox Church, gave rise in his later Marxist polemical and quasi-philosophical writings against mathematics to attacks on mathematicians specifically on the grounds of mysticism in the form of Russian Orthodox Christianity. Kolman joined the Communist Party (Bolshevik) in 1917.

A brief chronology of his career in the Soviet Union precedes a list of his publications in *Matematika 40 Let* [1959, 325]. The second German edition [Kolman, 1982a] of his autobiography contains a detailed chronology (Lebenslauf) and a partial listing, without sources, of his own bibliography of 560 items. His first writings (from 1912) are in German, and deal with Judaic issues. One in 1927 in Russian is listed in German as: Sind uns die Juden Feinde? [Pseudonym: I. Kotschetkow]. His chronology (which may not be accurate, since it is not clearly supported by the body of the autobiography itself) gives the reader an idea of the degree of Kolman's political activism on the ideological and mathematical fronts. His rapid rise was greatly facilitated by the lack of suitably educated but ideologically correct individuals on whom

- (1) to base the ideological conflict with conservative scientists and philosophers in the Soviet Union in the 1920s and 1930s; and
- (2) to display to the West intellectually respectable Soviet Marxist scientists.

Although the documentary evidence supports some solid mathematical training before his conscription into the Austro-Hungarian army, the long 11- or 12-year break before he resumed “academic” activity may be responsible for the largely polemical and philosophical, rather than technical, nature of his subsequent mathematical writings. Additionally, the overweening zealotry and activism of his “old Communism” permitted him little time for the sustained concentration that mathematics requires.

His early manifestations of formal mathematics, in the company of a mathematically star-studded mathematical cast from the U.S.S.R. (e.g., P. Alexandrov, Moscow; N. Chebotarev, Kazan; M. Kravchuk (Kravtschuk; Krawtchouk), N.M. Krylov, and M.G. Pfeiffer, all Kiev) in the international arena at the International Congress of Mathematicians in Zürich, 1932, had the titles “Über Marxens Begründung der Differentialrechnung” and “Funktionen quaternionaler Veränderlichen.” He is listed as representing *Kommunistische Akademie (Moskau)* while his ideological colleague Professor M. Orloff (i.e., M.Kh. Orlov) is listed under *Mathematisches Institut der Ukraine (Kharkow)*.

According to his biography [Kolman, 1982b] he did not return to Moscow and academic activity [*nauka*] till March, 1931, at the Marx–Engels–Lenin Institute (MELI), where he was put in charge of the Marx office. The recently arrested director of MELI, Riazanov, was thought to have suppressed publication of many of Marx’s manuscripts, in particular Marx’s mathematical manuscripts, since Riazanov was not convinced of their academic value, on the advice, as Kolman p. 172 says, of the “mediocre German mathematician Gumbel¹⁵ . . . who did not grasp their methodological significance.” Something similar, says Kolman [1982b, 172] occurred with Engels’ *Dialectic of Nature*. Einstein was asked to comment on the significance of this but “. . . did not grasp the enormous philosophical significance . . . since Einstein generally did not understand dialectics.”

It was with this kind of mathematical and philosophical background that Kolman attended, in the summer of 1931, as part of the Soviet delegation, the 1931 International Congress of the History of Science and Technology (see our Section 1), where he presented no less than three communications and secured his place in the western Marxist scientific pantheon as a philosopher and mathematician. The papers with the description of their author are:

Dynamic and statistical regularity in physics and biology. E. Colman [*sic*] President of the Association of the Scientific Institute of Natural Science, Professor of the Institute of Mathematics and Mechanics, Moscow; Member of the Presidium of the State Scientific Council.

The present crisis in the mathematical sciences and the general outline for their reconstruction. E. Colman.

Short communication on the writings of Karl Marx dealing with mathematics, the natural sciences, technology, and history of these subjects.

Kolman’s academic activism had in fact resumed earlier than March, 1931. In Kolman [1979, 131] there is a separate section entitled *Direktor eines Literaturverlages*, which refers to his work from 1926

¹⁵ Emil Julius Gumbel (1891–1966). Eminent German mathematical statistician of strong Marxist beliefs, who, in spite of strong support from von Bortkiewicz and Fréchet, had difficulty in finding academic employment due to his activism and strong links with Moscow, and the two World Wars. He eventually obtained a position at Columbia University in New York, where in 1958 he published his magnum opus “Statistics of Extremes.”

as chief editor of the publishing house *Moskovskii Rabochii* [*Moscow Worker*], and in August 1929 he commenced work attached to the Ts.K. VKP(b) [Central Committee of the All-Union Communist Party (B[olshevik])], as assistant to the Director of Agitprop [Agitational Propaganda], which in one of its buildings contained all publications of the Soviet Union. In a section entitled *Three meetings with Stalin* Kolman [1982b, 162] writes:

I regularly visited it in order to borrow those books with which, by the nature of my work, I was obliged to read

and goes on to say that at his first accidental meeting he was carrying a pile of books on “mathematics, physics, etc.” Stalin’s only comment about them was: “All mathematics!” The second meeting with Stalin was during the time of the 16th party congress in the summer of 1930, for which Kolman had been included in the editorial commission [Kolman, 1982b, 163]. In his autobiography he speaks in this section in regard to this Congress only of his attempt to correct in a written version Stalin’s poor Russian language. But in the same section it is clear that by 1933 or 1934 at the latest, he was on good terms with Kaganovich, who regarded him as a mathematician.

The preceding passages show that at the time of the publication Kolman [1926], he was closely connected with the beginning of his official propagandist activities in the sphere of mathematics, with a special focus on probability. They explain his influence on the Marxist reconstruction of mathematics from the starting-off point of the 16th Party Congress, and in particular his connection with Kaganovich.

To the above it is necessary to add the following items from his chronology in Kolman [1982a 447].

- 1932 Direktor des “Instituts der Roten Professur”
(= Fachschule für die wissenschaftliche Ausbildung von Parteikadern).
- 1933 Mitglied des Presidiums der Kommunistischen Akademie (= Parteihochschule).
- 1934 Professor der philosophischen Wissenschaften der Moskauer Universität.
- 1939 Ordentlicher Professor für Mathematik an der Moskauer Universität;
im März Berufung zum Wissenschaftlichen Mitarbeiter des
Instituts für Philosophie der Akademie der Wissenschaften der
Ud SSR und Leiter der Abteilung für Diamat (= Dialektischer Materialismus).

Kolman died in the bosom of his family in Stockholm, Sweden, on January 22, 1979.

Appendix B. M.Kh. Orlov

Mikhail Khrisanovich Orlov is listed on p. 523 in [Matematika 40 Let, 1959] as living 1897–1944, and credited (pp. 523–524, 814) with a total of 12 publications from 1931 to 1936. Most of these are in Ukrainian; the others are in French and German. *Matematika i Religiia* [Orlov, 1933], and his textbook in two parts [Orlov, 1931b, 1932], also in Ukrainian, *Inzhenerna Matematyka*, are not included in the listing. Such omissions and tactical inaccuracies are characteristic even for Party activists who died in the purges; and *Matematika za Sorok Let* was produced only a few years after Stalin’s death. Orlov was in fact arrested August 12, 1936 and charged with belonging to the TTO (Trotskyite–Nationalist Terrorist Organization), sentenced October 20, and executed by shooting October 22 [Rozhenko and Bohats’ka, 1996].

Orlov was a Corresponding Member of the Ukrainian Academy of Sciences, and the following information about him comes from the book about it: *Akademiia Nauk USSR* [1982].¹⁶ Judging from the date of death and the relatively recent provenance of the book, it is probably accurate. The entry is in Ukrainian. The words in brackets are the Russian versions of proper names.

Orlov Mykhailo [Mikhail] Khrysanovych [Khrisanovich] (7.1.1900–17.10.1936) mathematician, Corresponding Member (1934), Member of the Communist Party of the Soviet Union (from 1919). Born in Kyiv [Kiev]. Graduated from the Kyiv Institute of People's Education¹⁷ (1924). Worked there as lecturer; Dean of the Faculty (1924–1930); and simultaneously at the Kyiv Polytechnical Institute. During 1931–1934, Director of the Ukrainian Scientific Research Institute for Mathematics and Mechanics at Kharkiv [Kharkov] University. During 1934–1936, academic secretary of the Institute of Mathematics, and simultaneously, professor at Kyiv University and Kyiv Aviation Institute. During 1931–1935 attached to the Central Committee of the Communist Party (Bolshevik) of Ukraine.

Basically, his scientific writings relate to questions of computations of equilibrium of rotational nonviscous fluid mass, approximate methods for solving differential and integral equations, approximative computation, ballistics.”

Orlov was denounced for belonging to the TTO with 36 other people [Rozhenko, 1996, p. 97], perhaps on grounds as tenuous as attachment to the Ukrainian language and culture in the face of increasing Russification in spite of Orlov's zealous Bolshevism. A similar fate, on a distorted pretext, befell his better-known, and mathematically far more eminent, colleague at the Institute of Mathematics of the Ukrainian Academy of Science, Academician Mykhailo P. Kravchuk (1892–1942), after whom the “Krawtchouk” polynomials are named [Seneta, 1993]. Any semblance of Ukrainian nationalism was anathema to Stalin [Bilokin', 1999].

In the Foreword to Part 1 [Orlov, 1931b] of *Inzhenerna Matematyka* Orlov writes in his point 3) that there is a special need by students in Ukrainian technical institutes for a book in the Ukrainian language, since in these institutes explanations exercises and questions are carried out in Ukrainian, while textbooks are exclusively in Russian.

Part 2 [Orlov, 1932] has its Foreword largely on the dialectical materialist philosophy of mathematics, in particular that mathematics is *not* apolitical and *not* free of connotation of social class. The great mathematician Academician Sergei N. Bernstein is accused by Orlov in the Foreword (p. 4) of holding contrary, and hence unacceptable to Marxists, views.

Bernstein was heavily involved in education reforms in the Ukrainian SSR, but did not favor the use of the Ukrainian language during the short period of Ukrainization. After the Kharkiv Mathematical Congress in 1930, in reference to the formulated “problem” of applications of the method of dialectical and historical materialism to mathematical investigations, convinced like most mathematicians that there was no intersection at all between these notions but unable to keep silent, Bernstein published a letter in which he declared that dialectical materialism led to mathematical illiteracy. This view was strongly attacked in a paper by M.Kh. Orlov [1931a] entitled *The fight for Marxist–Leninist methodology in mathematics*, of which a large section is cited verbatim by Bogoliubov [1991]. See also Rozhenko [1996, p. 169] for Orlov's attacks on Bernstein, who was replaced as Director of the Ukrainian Institute of Mathematical Sciences in Kharkiv by Orlov. Bernstein left Kharkiv in 1933 for Leningrad just before purges at Kharkiv University began. The chairman (1927–1933) of national commissars for education of Ukraine, Mykola V. Skrypyk (1872–1933), a supporter of Ukrainization though a committed Stalinist,

¹⁶ The book is so titled. The “U” in this instance stands for “Ukrainian,” and not for “Union.”

¹⁷ This was the name, for a period, of Kyiv University. (ES)

under Stalinist pressure committed suicide; but as we see above, Orlov's career had some time yet to run in Kyiv, in effect after promotion. Kharkiv was capital of Ukraine till 1934; the capital designation was then moved back to Kyiv.

Appendix C. Kolman's autobiography

We have used three versions: German [Kolman, 1979], German [Kolman, 1982a], and Russian [Kolman, 1982b]. The “most recent” is the Russian-language edition, which is said in the Preface by his son-in-law Janouch to be the same as the Czech edition. Inasmuch as Kolman wrote the original MS in Russian, although his first languages were Czech and German, it may convey detail more extensively and nuances of meaning most accurately. Kolman also participated in the translation leading to Kolman [1982a], which in its first part is a second edition of Kolman [1979]. All three versions differ internally in the presentation of Kolman's story, in section headings, and in scope of the autobiography. (The original Russian MS consisted of more than 2,100 pages, which have been archived. It may be that these contain some of the contentious material missing from the printed versions. Comments on the successive MSS are made by Haefs in Kolman [1982a] and Janouch in Kolman [1982b].

Kolman [1982a] is the most useful version inasmuch it has an expanded part on documents (pp. 341–369) and a fourth part (*Anhang*) containing in particular extensive footnotes, a name index with each name annotated, a chronology of Kolman's life, and a list of his publications. These may have been prepared after Kolman's death (January 22, 1979) and seem to differ from the contents of the body of the autobiography itself, and of the short biography in *Matematika v SSSR za Sorok Let*. [*Mathematics in the USSR Over 40 Years.*]

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¹⁸ There is no entry for Ernest Kolman in the 1934 edition, although Khotimsky appears (60, 111–112). There is no mention of an Institute of Red Professors. In the 1938 edition there is an entry for Kolmogorov (33, p. 531), but none for Ernest Kolman. Kolmogorov is the mathematics editor of the single commemorative volume of 1947, and Schmidt is in the editorial collective. Kolman does not appear.

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¹⁹ A pistol-waving account in the style of early Kolman. Hruby apparently studied under Kolman, a fellow Czech.

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²⁰ The title page also reads: E. Kolman and A.P. Yushkevich *Matematika do Epokhi Vozrazhdeniia* [Mathematics upto the Renaissance]. Kolman's is supposed to be the earlier of two books; the second was to be by Yushkevich. The books were to be produced under the aegis of the Institut Istarii Estestvoznaniia i Tekhniki [Institute for the History of Science and Technology] of the Akademiia Nauk SSSR [Academy of Science of the USSR].

²¹ A letter dated 12 February, 1976, concerning Brandt's book *Ein Traum, der nicht entführbar ist*, and Kolman's contact with Robert Havemann.

²² Also published in Danish, 1980, and Swedish, 1980.

²³ Commemorating Robert Havemann's 70th birthday.

²⁴ There is no ISBN number.

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²⁵ This was the article attacking Bernstein for not following the Marxist-Leninist line as Director of the Mathematical Institute of the Ukrainian Academy in Kharkiv, and saw Orlov replacing Bernstein in this capacity.

²⁶ This is the second edition, used by Florensky in a Russian translation (1911) by V. Bazarov and P. Yushkevich. The first English edition appeared in 1892.

²⁷ The Bykivnya Forest, near Kyiv, is the site at which many victims of 1936–1937 are buried.

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²⁸ Havemann was an eminent East German physical chemist and Marxist ideologist. As with Dirk Struik, Kolman associated with those few whom he regarded as equals academically and of like ideology. For contact with Havemann see [Kolman \[1977\]](#). There is a mention of Havemann on p. 241 of [Kolman \[1979\]](#), a published birthday letter [Kolman \[1980\]](#), and a mention in the biographical preface to [Kolman \[1982b\]](#) by Kolman's son-in-law František Janouch (Havemann wrote a letter of condolence to Kolman's wife on Kolman's death).

²⁹ This is followed on pp. 156–161 by documents on Kolman's sojourn at the IIET (Institut Istorii Estestvoznaniia i Tekhniki, The Institute for the History of Science and Technology).

³⁰ An obituary in Swedish of Yekaterina (Katya) Koncevaya Kolman (1910(?)–1997), 3rd partner/wife of Arnošt (Ernest) Kolman, in the leading (liberal) Swedish daily.

³¹ Section 3.3 is on Chuprov and Nekrasov.