HAL
open science

The beginnings of the soviet encyclopedia: Utopia and misery of mathematics in the political turmoils of the 1920s.

Laurent Mazliak

To cite this version:

Laurent Mazliak. The beginnings of the soviet encyclopedia: Utopia and misery of mathematics in the political turmoils of the 1920s.. 2017. hal-01619057

HAL Id: hal-01619057

https://hal.science/hal-01619057v1

Preprint submitted on 19 Oct 2017

HAL is a multi-disciplinary open access archive for the deposit and dissemination of scientific research documents, whether they are published or not. The documents may come from teaching and research institutions in France or abroad, or from public or private research centers.

L'archive ouverte pluridisciplinaire **HAL**, est destinée au dépôt et à la diffusion de documents scientifiques de niveau recherche, publiés ou non, émanant des établissements d'enseignement et de recherche français ou étrangers, des laboratoires publics ou privés.

The beginnings of the Soviet encyclopedia.

Utopia and misery of mathematics in the political turmoil of the 1920s.

Laurent MAZLIAK

The beginnings of the Soviet encyclopedia.

Utopia and misery of mathematics in the political turmoil of the 1920s.

Abstract: *In this paper, we focus on the beginning of the publication of the Great Soviet Encyclopedia, which was launched in 1925. We present the context of this launching and explain why it was tightly connected to the period of the New Economic Policy. In the last section, we examine four articles included in the first volumes of the encyclopedia about randomness and probability in order to illustrate some debates from within the scientific scene in the USSR during the 1920s.*

Key-Words and Phrases: *National encyclopedia. USSR. New Economic Policy. History of probability theory. Foundations of Probability. Otto Shmidt. Veniamin Kagan. Arthur Bowley.*

Introduction

The Great Soviet Encyclopedia (GSE) was a gigantic enterprise dedicated to the glory of "Marxist science" and of the Soviet regime. There were three editions: the first one was launched in 1926, the second one in 1949, and the third one in 1977. A brief consideration of these years alone casts light on the enormous differences between the three editions. That is, one observes that if the second and the third were launched in a relatively short period of time—nine years for both—the first edition needed more than twenty years to be completed.

Generally speaking, the second edition of the GSE was characterized by the Stalinist glaciation of the 1950s, when, after World War 2, the Soviet Union and its satellite countries were more or less isolated behind the Iron Curtain. The third edition represented the last attempt for the declining regime to present a general picture of the Soviet conception of the world, indicating a deep consolidation of the most salient aspects inherited from the Stalinist period. Thus, clearly, the first edition represents the richest historical source of the three editions by providing a better understanding of how Soviet thinking was constructed after 1917. There are several reasons why this edition provides such a wealth of historical knowledge. First of all, it is precisely so because it was the first edition: it imposed several forms on the encyclopedia that would be continued in the following editions. Among these forms, the most obvious was the choice to alphabetically order the entries so that the publication may be seen as an encyclopedic dictionary. This approach bore innumerable consequences. Other choices were kept in future editions: a rather small size dimension for the volumes, a two-column display of the pages, two sizes of fonts with large or small letters, and the presence of numerous pictures and drawings. Importantly, this edition also included among its collaborators a huge number of prominent scholars of the Soviet academic scene of the time.

A detailed study of the first edition of the GSE was the subject of a PhD thesis prepared and defended by Brian Kassof in Berkeley. Based on his dissertation, Kassof published the paper (Kassof, 2004) from which we shall apprehend the context and the contents of the first edition: how and by whom was the encyclopedia launched, how the authors were chosen or refused on political or pragmatic bases, how the somewhat chaotic order of publication of the volumes after 1931 was decided, and so on. The most significant explanation for why this first edition is so informative is that the publication of its 55 volumes lasted more than 20 years—between 1926 and 1947—and therefore bears witness to the enormous changes met by the

Soviet Union during this period. As Kassof mentions, "the duration of the GSE's publication (65 volumes spread over 21 years), together with the fact that its parts were supposed to constitute a cohesive whole, make it an excellent vehicle for tracing changes in beliefs and practices over time".[1]

Up to 1931, the order of publication of the volumes was almost regular and predictable. Volumes 1 to 10 were launched during the first five years, and we shall limit ourselves to this period in the present paper. Though it may seem a quite short period, it is worth noting that the USSR began the 1920s in the violence of war communism, followed since 1922 by the very particular time of the New Economic Policy (NEP). The decade reached an abrupt conclusion after 1928 with the end of the NEP and, in the academic world, with a new violent fight against bourgeois specialists. The volumes of the GSE published during the five years between 1926 and 1930—joining the immediate aftermath of Lenin's death in 1924 to the consolidation of the Stalinist dictatorship—were written in the context of the prevailing Soviet orthodoxy of this period. The GSE is therefore significant to document the intellectual history of these complex times, a history marked by the still-vivid ambition that Bolshevik Russia would spearhead a world revolution.

From its very origins, the project of publishing the encyclopedia was meant to have an ideological basis, thereby justifying its necessity and its coherence to the educational propaganda of the regime. We shall return to this point at length later in this paper. The promoters of the project were interested in proving that, in the past, the importance of this kind of enterprise had already been established in relation to the proletarian revolutionary movement. Kassof, in his study, mentions a 1929 article in *Pravda* by Osinskij[2] asserting that, for the Bolsheviks, the GSE's only true predecessor was Diderot and d'Alembert's encyclopedia.[3] Much later, the historian Petrov, in an article[4] about the birth of the encyclopedia in the USSR, also mentioned a text written by Jaurès in 1901:

> *In my eyes, the hour comes closer when the socialist and revolutionary proletariat must acquire an organized doctrine of the universe and of life. What the Encyclopedia has been for the revolutionary bourgeoisie, a new encyclopedia, infinitely bolder and wider, will have to be for the proletariat. We shall have to resume the movement of human thought from Kant to Renan, through Hegel, Comte, and Marx. We shall have to resume the movement of science from Laplace to Maxwell, through Darwin, to offer the key findings and the main trends to the proletariat who wants to live its life to the fullest, and to project a bright light on the universe where the enlightenment of individual thinking will mix with the fiery radiance of social life.*[5]

When the first volume was published in 1926, the editorial board shelled out a preface to reveal the GSE's general program, for which the scientific method was presented as the main principle of the publication because it perfectly suited the political aims of the new regime. As communist economist Maria Natanovna Smit-Falkner (1878-1968) (to which we shall return at length in the third part of the present study) expressed:

---

[1] (Kassof, 2004; 59)

[2] Nikolaj Ossinskij is the nom de plume of the journalist Valerian Valerianovich Obolenskij (1887-1938). He was in particular known as the founder of the journal *At the wheel* (*За рулём*), which promoted the development of cars in USSR.

[3] (Kassof, 2004 ; 62)

[4] (Petrov, 1960).

[5] (Jaurès,1901)

> *The more the socialism in our country will progress, the stronger the influence of the scientific thinking on life will be, and the greater the role of the scientific and social organizations for the resolution of practical questions will be.*[6]

A major theme of the aforementioned preface from the editorial board was the thorough transformation of the political situation in Russia, which had implied the emergence of a new kind of readership. It was necessary to make some concessions to the spirit of the times and to assert that the volumes of the GSE would be accessible to factory workers, the alleged new masters of the Soviet society:

> *The Revolution created a new reader, with new questions, with the persistent desire to acquire an orientation in all the variety of the contemporary world, to systematize his knowledge, to strengthen his conception of the revolutionary and materialistic world, to get acquainted with the last advances of science. Our time is a period of transition from capitalism towards socialism, when in a fundamental way the material bases as well as the social relationships and the ideology are transformed.*

The GSE had to be of a different nature from the previous encyclopedias. The board was thus eager to emphasize the differences between former enterprises—especially, those from the Russian czarist-period—and the new publication, due in particular to a different ideological approach. "A great deal of stress was placed on the GSE's socialist identity"[7] by its first promoters, the mathematician Otto Yulievich Shmidt (1891-1956) (to which we shall return at length later) and his associate the publisher Miron Borisovich Vol'fson (1880-1932). In the GSE, "historical rubbish" and religious trivia were to be replaced by information on the natural, applied, and social sciences, which were "directly necessary for the construction of socialism". Kassof[8] comments on what appears to be Vol'fson's genuine, optimistic faith in the power of his work. The board wrote: "*One felt that the previous dictionaries were written for scholars with an interest primarily in literature and history*". It should be observed that such an argument was rather tendentious. In several pre-Soviet encyclopedias—in particular, in the most famous Brokgauz i Efron (*Энциклопедический словарь Брокгауза и Ефрона*), which was published between 1890 and 1906—science and, especially, mathematics were very largely present with detailed articles that were often quoted by the authors of the entries of the GSE. The board did not mention it explicitly for obvious political reasons, but there was a clear filiation between the promotion of the scientific methodology in every domain of knowledge by a large part of the Russian intelligentsia at the turn of the 20th century and the approach proposed in the GSE. A good example is given by the enterprise of Mikhail Mikhailovich Filipov (1858-1903) and his journal *Scientific Review* (*Научное обозрение*). Korobkova[9] mentions that, for Filipov, "*the state of society is conditioned by the level of intellectual development and scientific knowledge*" and "*intellectual and socio-economic developments are correlated and determine the course of history*".

Despite the aforementioned filiation, the words "scientific knowledge" probably did not mean exactly the same thing to Filipov and the editors of the GSE. For the latter, the scientific

---

[6] (Smit-Falkner, 1927; p.15)
[7] (Kassof, 2004; 61-62)
[8] (Kassof, 2004 ; 61)
[9] (Korobkova, 2014; 191-192)

method was to be tested through a *Marxist-Engelsian* sieve with a Leninist touch: dialectical materialism. Observe nevertheless that, in its preface, the editorial board of the GSE carefully admitted that if the "*humanities, to understand both the past and modern times, have already been extensively transformed on the basis of a continued application of Marx and Lenin's dialectical method*," the situation was not the same in the natural and exact sciences. Marxist science, in other words, was not advanced enough. It clearly followed that the GSE would generally expose the "classical bourgeois" science of these domains. The board, of course, had the wisdom not write this consequence down explicitly. And they carefully noted that if *"a large place is attributed to the exact and natural sciences"* in the GSE, it is *"not for the dry description of the different kinds of plants or various abstract questions. For the GSE, the natural sciences are the foundation of the work for the domination over the forces of nature and for their use for human needs."*

The ambiguity of the position of the natural sciences (and of its specialists) was always a kind of Achilles' heel for the Soviet ideological stage. In 1929, when the Marxist historian Mikhail Nikolaevitch Pokrovsky (1868-1932) announced that the necessity of relying on non-Marxists and "fellow-travellers" in higher learning was coming to an end, he added '*except, of course, for natural science*'. [11]

As mentioned above, in his PhD thesis, Brian Kassof made a deep study of the GSE as a "book of socialism," and from his work, we obtain a rather complete understanding of the general enterprise and of its connections with Soviet and, particularly, Stalinist politics. But, obviously, it was not in Kassof's agenda to look more precisely at specific domains, as is precisely the aim of the present paper: to give some information about how science—more particularly, mathematics—was treated in the GSE during its first years, with a special focus on probability theory as an illustration of the ideological background of its publication.

It may be a natural question to ask why focusing on mathematics has relevance. I see at least two immediate answers, which, moreover, are not independent. First, a mathematician, Otto Shmidt, directed the whole enterprise. Second, mathematics played a major role in the vision of science defended by Soviet Marxist ideologists. This aspect was thoroughly studied by Vucinich.[12] As Vucinich explains, it took some years for Soviet Marxist philosophers to write about mathematics because there were few open comments in Marx, Engels, and Lenin's writings on that topic. But, there was a sustained reflection on the precise role expected of them during the 1920s. Though it may sometimes drift into harmful abstraction, mathematical language is the natural language of exact science and therefore must be given a central place. As Vucinich explains, a fundamental aspect is that more than any other discipline, mathematics supplies incontrovertible proofs of the unity of science, which, in turn, provides conclusive proof of the unity of nature. It is understandable, then, that the questioning of the room devoted to mathematics in a "scientifically based" encyclopedia is important.

The present paper is organized as follows. In the first part, we comment on the Soviet conception of the scientific method and how the intelligentsia faced the new regime's demands. In the second part, we present the origins of the GSE project, its editors, and the connection with the Soviet politics of the 1920s. In the third and final part, we focus on the question of the mathematics of randomness in the USSR by examining four entries belonging to the first volumes of the GSE.

---

[11] (Joravsky, 1961; 70)

[12] (Vucinich, 1999; see in particular pp.108-111)

I - Some comments about Soviet science in the 1920s

1- The difficult relationship between the Intelligentsia and the new power

The launching of the GSE project in 1924 happened in a particular context whose instability simultaneously favored the genesis of the enterprise and required a great deal of flexibility and environmental adaptability from the editors and collaborators. We shall later show that this had consequences even for the entries about mathematics.

The relationship between the Bolshevik regime and the Intelligentsia had in fact been complicated since the very conquest of power in 1917. To the eyes of the most sectarian Bolsheviks, it was a typical conflict of classes insofar as the Intelligentsia, in its bourgeois way of living and thinking, proved to be a product of the old czarist society. One of the most crucial aspects of this opposition was its total defiance of the Intelligentsia's way of dealing with the education of youth. The harsh period of war communism met the peak of these tensions with the brutal decision for a proletarization of the whole scientific and technical personnel.

The Agitprop (Bureau for Agitation and Propaganda) was founded in 1920 under the supervision of the Secretary of the Central Committee in order to "organize, unite, and direct the oral and written work of propaganda and agitation" within the party, and this political propaganda was highly concerned with educational questions. It was especially efficient to denigrate the "old" and "bourgeois" specialists in educational institutions, which were created in parallel with the old institutes and universities after the revolution, which were designed to educate "red" specialists and to proletarize the universities. The Socialist Academy was created in 1919 and became, after 1920, the workers faculties and, at the end of 1923, the Communist Academy. Moreover, this institutional politics was often accompanied by political violence. There were many press campaigns and show trials with members of the Intelligentsia as targets. The GPU (State political direction, the State police) established a strict surveillance of scientific technicians who were often accused of sabotage.

The period saw a drastic silence imposed on academic specialists who were considered to be bourgeois representatives responsible for damaging socialist edification. The targets were in the first place specialists in the humanities: historians, economists, or philosophers judged irretrievably by the Bolsheviks. A famous example is the "philosopher's steamboat" event of 1922, during which many academics, including Nikolaï Berdiaev and Lev Shestov, were exiled from Russia to Western Europe. As Trotsky declared, "*there was no sufficient pretext to shoot them, but it was no longer acceptable to bear them*".[13] In his 2007 thesis, Kazanin[14] emphasizes that one of the most effective means of pressure used to transform intellectuals into pariahs dependent on the regime's goodwill was to forbid their children to study in universities or institutes.

Due to this political ideology, the country was worn out by 1921. Lenin therefore instituted the radical change of the New Economic Policy (NEP), to which we shall return at length later. Harsh disputes broke out at the top of the Bolshevik party between the "inflexible communists", such as Jozef Unszlicht, who asked for an always stronger control of the Intelligentsia by the GPU, and the "liberal communists", who accused the former of leading the country to ruin and not taking into account Lenin's advice that "*the best organizers and the top experts [could] be used by the state [also] in the old way, in the bourgeois way (i.e., for high salaries)*".[15] The liberal communists asked for measures to stop the waste of forces, which they perceived to be essential to the reconstruction of the country. A momentous article

[13] (Ossorgin, 1955; 183)
[14] (Kazanin, 2007)
[15] (Lenin, 1918).

in *Pravda* on 3 January 1922 calling for the immediate termination of such nonsense was published after Vladimir Vasilievich Oldenborger (1863-1921), a 58-year-old highly qualified hydraulic engineer, committed suicide because of a smear campaign organized by several local leaders of the Bolshevik party who accused him of counter-revolutionary sabotage. Another, less tragic, example, at the same moment (21 January 1922) is given by Mikhail Ivanovich Kalinin (1875-1946) (the president of the Executive Central Committee), who ordered the local authorities to stop hindering the work of the statisticians in many provinces by depriving them of decent office buildings.[16]

2 - The NEP turning point

Lenin's decision to launch the NEP led to a partial and complex return to a free market economy after 1921, attaining its heights around 1925. This radical change allowed the liberal communists to decree a whole series of reforms, including the relaxation of the politics of "class selection," leading to a progressive normalization of the situation of the Intelligentsia—and, especially, of engineers and scientists. Kazanin[17] mentions that, in many meetings of the Politburo, the problem of reconciling the interests of the government with the technical intelligentsia was evoked. It appeared of vital importance for the regime to bring the technical qualifications of specialists at the forefront of their fields and to relegate the question of their political and social orthodoxy to the background, at least for a while. During the meeting of the Political Bureau on 11 December 1924, it was mentioned that:

> *The state apparatus in its activity has to use experts not only from party workers -- the number of which in Soviet institutions is insignificant -- or from workers without party, but, above all, from intellectuals and elements belonging to other classes, often even those who are alien to us, without which the state apparatus can currently not do.*

A calming down of the tensions between the authorities and the intellectuals was looked for so that the old specialists would be in a better position to prepare the future executives, many of whom would be workers and peasants.[18]

The years of the NEP were an occasion for great political pragmatism. In August 1925, a report sent to the Central Committee of the Bolshevik party proposed a series of measures designed to establish suitable conditions for a harmonious collaboration between the new executives and the former specialists, thereby guaranteeing a transfer of experience that "*can be realized only through common practical work during a significant time under the supervision of the old specialists*".

A significant measure promoted by the NEP was the reopening of private publishing houses, on the one hand, to improve the publishing activity in the USSR. On the other hand, it was meant to give new platforms to the representatives of the "old" intellectual class for which access to publications controlled by the political sphere, such as the journal *Under the Banner of Marxism* published by the Communist Academy, was difficult.

In 1921, the celebrated publisher Ivan Dimitrievich Sytin (1851-1934) observed that the volume of publications released by private publishers had become insignificant in comparison to that of the Gosizdat (State Publishing House of the Russian Federation), which was created in 1919. However, Sytin was optimistic that the Gosizdat would put the private publishers `on their feet' by ordering the printing of books from them on a contractual basis. And, at the

---

[16] (Mespoulet, 2001; 240)
[17] (Kazanin, 2007; 345)
[18] See for instance (Kazanin, 2007; 348 *et seq.*)

same time, this would have enabled the Gosizdat to make use of the rich experience of the old publishers.[19]

Otto Shmidt (to which we shall return in the next section), the man who was to become the editor-in-chief of the GSE, also observed the deficiencies of the Gosizdat whose head he was since 1921:

> *The Gosizdat must prove that it publishes books easily, well, and cheaply and, then, it will, of course, be out of reach of competitors. (...) A very curious experiment takes place in Russia. We build the largest publisher in the world, but we do not give it any commercial aims, but only cultural and political ones.*

Another important decision inspired by the NEP was the reintroduction of stock companies as a form of entrepreneurship in order to facilitate the development of financial packages to support the activity of the company. The 1920s experienced the creation of a great number of private and cooperative publishing houses and a drastic increase in the number of journals and books production.[20]

In a paper[21] he published in 1929 for the tenth anniversary of the creation of the Gosiztat, mathematician Veniamin Fëdorovich Kagan (1869-1953) explains[22] how, beginning approximately in 1925, the situation had deeply changed in the country and how there were new requirements for a more profound and serious higher education, and how the realization of these expectations required serious scientific books in the first place. If, until 1925, it was necessary to fight for the cause of the scientific book, after 1925, it became an object of general interest. Two diagrams provided in Kagan's paper[23] show how the publication of scientific books received a sharp increase in 1925, doubling during that year to attain the enormous figure of 93 million copies produced and a total number of more than 7,000 titles. Not surprisingly, more than the third of them received the classification of "technology" (*техника*), though the number of titles in mathematics and physics (*физико-математические книги*) was far from negligible at 465. And Kagan proudly explains[24] that these impressive figures do not only concern production but also distribution. He mentions that a mean of 45% of the total production of new books was sold in a record time of 6 months. It is worth noting that, at the end of his paper, Kagan made some comments about how, in 1929, a sharp reorganization of the publishing houses in the USSR was under way. Its goal was to centralize publication under the direction of the Gosizdat, "*which was responsible for* only *25% of the total scientific production*" (my emphasis). This is one of the numerous hints that marked the "great break" and the end of the liberal period of the NEP.

3- Dialectical materialism in the USSR

In the 1920s, dialectical materialism became the official ideological basis for the philosophy of science in the Soviet Union and remained so until the end of the communist era. It is therefore necessary to comment on this concept. It is far beyond the scope of the present paper to give a full account on this complicated matter, and the interested reader must consult

---

[19] (Ruud, 1990). p.182.
[20] See for instance (Kuznetsov, 2006; 111-112).
[21] (Kagan, 1929).
[22] (Kagan, 1929 ; 32). See more about Kagan in the second section of the present paper.
[23] (Kagan, 1929 ; 29-30)
[24] (Kagan, 1929 ; 33)

the fascinating studies provided by Joravsky[25] and Graham[26] to get a more specific picture of the situation in the 1920s.

The expression "dialectical materialism" (*diamat*) constantly appeared after its 1891 introduction by Plekhanov, the "father of Russian Marxism," in a comment on Hegel. Engels's writings were at the source of the scientific practice in Marxist science and Soviet dogma. For instance, in the preface of his *anti-Dühring*, Engels writes, "*a knowledge of mathematics and natural sciences is essential to a conception of nature which is dialectical and at the same time materialist*".[27] Engels's idea was that the aim of such knowledge allows one to concentrate on the general laws describing the processes of the material world.

A major obstacle to making it a sound basis for Marxist science in Soviet philosophy may be derived from the fact that nobody—from Plekhanov to his immediate followers—was able to give a reliable definition of *diamat*. During the 1920s, *diamat* was a moving target at which philosophers of science tried to aim from different and often contradictory directions. What makes the central period of the present article significant is that, as Joravsky puts it,[28] during the NEP, Marxist philosophers of science were considered to be autonomous specialists. Like specialists in various scientific domains, they ostensibly had some freedom to elaborate concepts away from political struggle. As Kalinin, the President of Soviet Union's Central Executive Committee, declared in 1925, "*Under the Soviet régime, Communist work is being performed essentially by everyone who is working honorably, conscientiously, in his own field*"[29].

A central debate of the 1920s opposed the scholars of a mechanist approach to science—for which the facts of the natural world were ruled through a collection of deterministic mechanical laws, allowing specialists in various scientific domains to follow their own methods and agendas—to scholars of the more drastic variety of a Marxist-oriented philosophy of science that sought to ensure the cohesion of the whole structure of science. Both groups claimed to base their vision on *diamat*. But, for the first group, who were supported by major leaders like Trotsky and Bukharin, *diamat* was only seen as a general principle and it was nonsensical that any philosophy should rule over scientific life. Trotsky, in particular, promoted the image of individual scientists setting their own research goals without regard for the demands of social utility, yet, without willing it, producing enormous social utility. As for Bukharin, *diamat* meant little more than a conscious formulation of what natural scientists were already doing,[30] meaning the determination of mechanistic-like laws governing the various phenomena of the physical world. On the other hand, the second group was led by the Director of the Philosophy Institute of the Communist Academy and, from 1926, the head of the journal *Under the Banner of Marxism*, Abraham Moisieyevich Deborin Joffe (1881-1963). For Deborin, a sound and strict philosophical basis was necessary to ensure the ideological adequacy of science, thus squaring it with Engels's views. Deborin and, even more radically, his students and followers saw the scholars of mechanism as supporters of a bourgeois positivism for which "science is a philosophy for itself." Such an approach was seen as a threat to the claim that philosophy itself is a science. At the beginning of 1925, Deborin challenged the mechanists by asserting that the method of dialectical materialism "*cannot be overthrown by particular, contingent facts, which themselves must be subject to a*

---

[25] (Joravsky, 1961)
[26] (Graham, 1993)
[27] (Engels, 1959; 16)
[28] (Joravsky, 1961 ; 60)
[29] Quoted by (Joravsky, 1961; 65). Observe the curious echo of this speech in Gorbachëv's words in **April** 1985, when he launched the so-called *perestroika***:** "Everyone in his place should do his work in good faith and honestly, that's all perestroika!" And then everyone says "what is perestroika?", "What is perestroika?" It's up to us to do our work honestly - this is perestroika!".
[30] (Joravsky, 1961 ; 101).

critical examination from the point of view of the general methodology".[31] For Deborin, what made *diamat* a universal philosophy was that it summed up the whole of human experience: it was the universal ontology - the study of the most general characteristics of all reality - and the universal methodology that allowed men to study all reality. There is little doubt about the "philosophical" sincerity of Deborin at that moment. As Deborin said: "*we proceed from the most profound conviction that materialist dialectics can help natural scientists raise natural science to a new, higher level, just as happened in the social sciences, thanks to the effort of Marx and Engels*".[32]

As is often the case when it comes to ideological battles, it was due to a small fraction of Deborin's students that the debate with the mechanists took a quite histrionic tone, because of their "*propensity to simplify and exaggerate*".[33] They simply expected philosophers to rule over natural scientists. The debate may have remained a battle inside the academic community, but the dramatic aspect in the context of the Soviet Union is that the Deborinist philosophy of science made "*possible a scramble for authoritative answers*". By 1928, the Deborinist fraction may seem to have secured the victory over the mechanists, as a thorough condemnation of the mechanists as anti-Marxist was issued at the Second All-Union Conference of Marxist-Leninist Scientific Institutions in April 1929. However, this was a short-term victory because, afterwards, Stalin made it clear that the fun and games were over. As Joravsky mentions,[34] it is not plausible to see the Deborinites's victory as a cynical attempt by Stalin to crush the mechanist fraction. But, it is clear that such behavior as adopted by Deborin's followers at the end of the 1920s favored the extension of political supervision to the academic scientific milieu. A good example for mathematics is Ernest Kol'man (1892-1979). He was educated in Prague, was taken prisoner during the Great War, remained in Russia, and joined the Bolsheviks with enthusiasm in 1917, when he began to be a political activist. After 1930, Kol'man became Stalin's watchdog in the Soviet mathematical community[35] and we shall return to him later in the present paper. In 1925, at the age of 33, he was just an obscure, young, and unknown mathematician. However, Kol'man launched a polemic in the journal *Under the Banner of Marxism* against one of the major mechanist-oriented scientists, Ivan Efimovich Orlov (1886-1936), about the true Marxist interpretation of randomness. It is worth observing that this polemic illustrates how even "officially communist" journals such as *Under the Banner of Marxism* did not present uniform opinions about science during the 1920s, even if the journal did not publish papers by non-political academics and obviously by opponents. The Communist Academy experienced harsh debates and various controversies. Both Kol'man and Orlov claimed themselves to be loyal supporters of the regime. Though Orlov rather ridiculed Kol'man in his answer,[36] the tone of these early exchanges provides a good example of what kind of potential violence is contained in such polemics when the central question shifts from scientific debate to political clairvoyance.

At the end of the 1920s, an apolitical attitude was in fact no more an option. The Varnitso (All-Union Association of the Workers in Science and Technology for the Support to the Socialist Construction), which was created in 1927, became a main actor of the general politicization of science. 1928 saw the beginning of intensely publicized trials of specialists accused of sabotage against the Soviet state. Stalin complained about the "*lag of theory behind practice*", a signal for the 'great break' for natural scientists for which neutralism was simply no more tolerated. Varnitso organized public accusations against scientists in the

[31] (Joravsky, 1961; 173)
[32] (Joravsky, 1961; 180)
[33] (Joravsky, 1961; 180)
[34] (Joravsky, 1961 ; 51).
[35] See (Seneta, 2004), in particular pp.359 and seq.
[36] See (Mazliak et Perfettini, 2017).

streets of Moscow and Kol'man declared that, in the class struggle, there was an urgent demand for a science that really serves socialist construction. And he concluded: "*Whoever is not with us, whoever is still neutral, is against us*".[37]

II - The encyclopedic project of the Great Soviet Encyclopedia

Kassof[38] presents how mathematician Otto Shmidt—assisted by Miron Borisovitch Vol'fson (1880-1932), a member of the direction of the Gosizdat—proposed the publication of a new "socialist" encyclopedia instead of a new edition of the existing "bourgeois" encyclopedias, such as *Brokgauz i Efron*. The project's genesis is thoroughly recounted in (Kassof, 2004), from which we shall take a great deal of information, with a particular focus on science and mathematics. In particular, the fact that Shmidt was an important mathematician of the time suggests that we begin by giving more information about him.

1- Otto Yulievitch Shmidt

Otto Yulievitch Shmidt[39] was born in 1891 in Belorussia to a family of German descent. He studied mathematics at Kiev's university and, following his study of Jordan's treaty on substitutions, began there his brilliant scientific career with research in group theory. After discovering Remak's theorems on the decomposition of finite groups, Shmidt proposed several extensions of these results and proved, in particular, a remarkable theorem found at the same time by Krull and named subsequently after them both.[40] Shmidt published his achievements in the book *Abstract Group Theory*[41], which was published in 1916 in Kiev.

At the same time, he became interested in political action for the improvement of university conditions; but, after the February Revolution, this interest developed into a more general concern about the future of Russia. During the summer of 1917, he decided to move to Petrograd and to work for the Provisory Government on the issue of food supplies. After the Bolshevik coup, he succeeded and became the new People's Commissariat for food supplies, indicating his skillfulness at this position, which must have been sufficiently remarkable for him to become indispensable. The opinion held about Shmidt at the top of the regime seems to have remained excellent in the subsequent years, as it was at the request of Lenin himself that Shmidt was put at the head of the Gosizdat. It is not obvious that Shmidt's scientific education played a role in this appointment, though Shmidt himself seemed convinced of the fact. In 1922, he wrote in a booklet[42] published for the fifth anniversary of the Gosizdat:

> *The upheaval and character of the extremely wide turn we experienced are reflected particularly in scientific literature. We shall build socialism on a scientific basis, on the basis of Marxist theory and Marxist transformation of all great scientific achievements.*[43]

On 17 April 1924, the Central Committee of the Party approved the project of publishing the Soviet encyclopedia, but the final choice of Shmidt as its editor-in-chief would

---

[37] (Joravsky, 1961; 236)
[38] (Kassof, 2004; 60 *et seq.*).
[39] Further details can be found in the biography (Koriakin, 2011) and in (Gliko, 2011).
[40] The so-called *Shmidt-Krull theorem* - see (Hungerford, 2008).
[41] (Shmidt, 2015).
[42] (Shmidt, 1922).
[43] Quoted in (Koriakin, 2011), p.48

take place only on 15 January 1925. Perhaps a cause of this delay in decision-making should be looked for in Shmidt's troubles at the head of the Gosizdat, where he was opposed to supporters of a strict propagandistic aim for the publications of the house. In November 1924, for instance, Shmidt openly complained that some people, to the detriment of its financial situation, seemed to wish for the Gosizdat to go on working as during the period of war communism. Ten days later, the *Narkompros* (People's Commissar for Education) dismissed him from his post. This may have facilitated his appointment at the head of the private company "Soviet Encyclopedia".

We shall see in the next subsection that a large majority of the members of the GSE's original editorial board were victims of the political storms experienced by the Soviet Union in the 1930s. It is therefore somewhat surprising that Otto Shmidt could remain at the head of the enterprise almost until the end (he resigned in fact in 1941), despite his proximity to many leaders, such as Bukharin and even, to a certain extent, to Trotsky.

It is enlightening to examine how Shmidt was able to weather the various ideological storms between 1928 and 1931 without too much harm. A most remarkable aspect of Shmidt's versatile personality was his attitude towards the problems of a Marxist philosophy of science. As Joravsky puts it,[44] he had probably the most practical and least 'philosophical' attitude of all the major figures, including mechanists and Deborinists. It is hardly surprising, therefore, that for a long time he kept out of philosophical controversy, though he did express some sympathy with the mechanists. At the Second All-Union Conference of Marxist-Leninist Scientific Institutions in April 1929 where Deborinists "triumphed", Shmidt felt it necessary to assert the primacy (*примат*) of philosophy and social theory in the elaboration of the Marxist philosophy of natural science. But, he did not feel it necessary to choose between the mature natural scientists with mechanist sympathies and the Deborinite militants; rather, he hoped to reconcile the two. To this end, he followed the mechanists' custom of deploring philosophical controversy as an internecine struggle distracting Marxists from their proper work of combating 'bourgeois' ideology.[45]

As we shall later see, in 1931, a rather violent ideological campaign was directed against how the GSE enterprise was conducted and, in particular, against Shmidt himself. Thus, it is somewhat surprising that at least he was not dismissed from his position, as happened to so many others. Maybe Stalin thought it was useless for the regime to touch an internationally celebrated scientist. Maybe, above all, Shmidt himself had the wisdom, at the end of the 1920s, not only to make a brilliant return to mathematics (he took up the newly created Chair of Higher Algebra at Moscow University in the year 1929 and remained there until his retirement in 1949), but also to participate in scientific expeditions, such as the German-Soviet expedition to the Pamir (1928) and, most notably, the long expedition to the Arctic (1930-1934), which removed him from the internal struggles tearing the party apart during the 1930s. Shmidt died in 1956 in Moscow and remains a rare example of a leader in the Soviet Union who, between the 1920s and the 1930s, was close to the power circles, without having been repressed.

2- The stock company "Soviet Encyclopedia"

Shmidt's original idea was to launch the encyclopedia in 1924, the date of his original contract with the Gosizdat. The work was supposed to be completed for the tenth anniversary of the Revolution in 1927. But, political and economic factors immediately intervened, delaying the start until 1926.[46] Additionally, as mentioned above, Shmidt was dismissed from

[44] (Joravsky, 1961 ; 191).
[45] (Joravsky, 1961 ; 191-192).
[46] See (Kassof, 2004; 63).

his position as the head of the Gosizdat in November 1924. He turned to the Central Committee for help and, in 1925, he used the economic facilities provided by the NEP to create the stock company “Soviet Encyclopedia” to fund the whole enterprise. It was placed under the direct responsibility of the Presidium of the Central Committee of the Party, with a series of stockholders. These stockholders included the Gosizdat, the cooperative publishing houses "Questions of Labor", "Worker of Education", the Publishing House of the People’s Commissariat for the Workers' and Peasant's Inspection, the publisher "News of the Central Election Commission of the Russian Federation", the publishing house *Pravda*, the stock company "International Book", the National Bank of the USSR, and the Commercial and Industrial Bank of the USSR. The relations between the apparently independent and private company and Soviet power were marked by the typical ambiguity of the NEP period. The company had a commercial agenda, but, at the same time and despite Shmidt and Vol’fson’s efforts to control the situation, the party leaders demanded to keep an eye on the enterprise. This resulted, for instance, in the highly political choice of the main editorial board (see next section).

One recurrent problem for scientists since 1919 was access to foreign literature. In 1921, Lenin himself had signed a decree, "Law on Acquiring and Distributing Foreign Literature", which was the basis for a Russian-German joint enterprise established in Berlin called "Book". Its goals were to import and export books and other printed materials. In 1922, a branch in Moscow was opened under the name of "International Book", which, on 11 April 1923 by special decree of the USSR Council of Labor and Defense, was reorganized into a joint-stock corporation with the same name. A list of merchandise started to include books, records, audio and video technologies, machine parts, antiques, precious stones, postage stamps, collectable coins, and banknotes. Access to foreign technical literature was, in fact, a constant worry for Soviet leaders during the NEP. On 13 August 1925, the Politburo mentioned that decisions were taken to facilitate the access of foreign literature to specialists.[47] Thus, by 1925, the various authors of the encyclopedia entries had access to a large amount of recent literature.

3- Kagan and the natural science section

Venyamin F. Kagan was the first editor in charge of the section "Natural and Exact Sciences.” Born in Lithuania in 1869, Kagan was a rather typical member of the Jewish intelligentsia. Involved in the democratic motion of students at the University of Saint-Petersburg (which resulted in his expulsion in 1889), he obtained his degree in mathematics under the direction of Markov and Posse. He was then appointed as Professor of Mathematics in Odessa in 1897 and remained there until 1923, when he took up the Chair of Differential Geometry at the University of Moscow. Notably, his 1921 lectures on the general theory of relativity were the first in Russia and one of the first in the world.

Kagan was the head of the *Journal of Experimental Physics and Elementary Mathematics* from 1902 to 1917. Additionally, he held an important role in publishing as the head of the house *Mathesis*, which specialized in the printing and diffusion of mathematical texts. *Mathesis* was described in (Lopschitz and Rashevskii, 1969) as the most important journal of mathematics in Russia.[48] At its inception, the books published by *Mathesis* were often translations of foreign books; mostly, these were works from the German cultural sphere, such as Arrhenius or Auerbach’s treatises. They also published the works of English authors, such as Newcomb and Perry, and Italian authors, such as Righi. Despite the fact that the second volume published by *Mathesis* was Henri Abraham’s *Recueil d'expérience*

[47] (Kazanin, 2007; 350).
[48] See also (Rikun, 2012).

élémentaires de physique, French textbooks were largely under-represented. The situation, however, gradually changed after 1910 with the translation of Poincaré and Borel's books. This draws attention to how the new school of French analysts—of which Borel was one of the main representatives—gained momentum in Russia in the 1910s. In the first years of 20th century, Egorov, Luzin and other members of the mathematical faculty of Moscow University visited or stayed in Paris and attended lectures given by Poincaré, Borel, or Lebesgue—at the precise moment when Lebesgue integration was beginning to conquer the world of analysis.[49]

With *Mathesis*, Kagan played an important role in popularizing science, something to which he committed himself throughout his life. A good example is provided by his 1910 book called "*What is algebra*?"[50] If the content of this book is not absolutely original in its exposition of the evolution of algebra, the author nonetheless displays a deep knowledge of recent textbooks—in particular, English, French and German. Furthermore, he exposes, in a remarkably concise and clear way, the various and sometimes-contradictory aspects of modern algebra as both an axiomatic system and an efficient tool for the resolution of problems. In several works, Kagan also explored the history of mathematics. More specifically, as an expert on Lobachevsky's work, he wrote several papers about the Russian mathematician and published in 1948 an authoritative biography (Kagan, 1948).

Because of this intense activity, Otto Shmidt invited Kagan to collaborate on the Gosizdat. He sent a rather pressing letter to his colleague in Odessa in 1922 in order to propose merging *Mathesis* with the Gosizdat and to head the scientific section. After he was appointed as editor-in-chief of the GSE, Shmidt invited Kagan to head the section of sciences of the GSE, as well. It is significant that, in the era of the NEP, this was done even though Kagan was not a Bolshevik. As explained above, in scientific domains—and contrary to the humanities—specialists were often chosen for their abilities without too much consideration for their political commitments. In the already-mentioned text he wrote in 1929 for the 10th anniversary of the Gosizdat, Kagan made some comments about his ideological role as the head of the scientific section of the Gosizdat. Although he wrote (p.31) that "*from a pure ideological point of view, the science section of the Gosizdat faced the necessity of purging the literature of all the mystical, metaphysical, theological, etc. tendencies which at that time abounded in almost all West-European textbooks*", the general tone of the text shows that his main tasks had been to encourage the production of new books and to improve their financial situation.

3- A periodization related to Soviet inner politics

As said before, in 1925 after he was dismissed from the head of the Gosizdat, Shmidt asked for the support of the Central Committee for launching the project of the GSE. He was probably aware that this would mean accepting further political control of the enterprise. When the Soviet encyclopedia was launched, apart from Otto Shmidt, the editorial board was comprised of thirteen members: N.I.Bukharin, V.V.Kuibyshev, M.N.Pokrovskij, G.I.Brojdo, N.L.Mechtcheriakov, L.N.Kritzman, Yu.Larin, G.M.Krzhizhanovskij, V.N.Miliutin, N.Osinskij, E.A.Preobrazhenskij, K.Radek, and I.Stepanov-Skvortsov. The interested reader will easily find information about these members from various sources. In his study, Kassof[51] explains that the choice of the two high-rank party members Pokrovskij and Kuibyshev was directly commissioned by the Politburo to control Shmidt, who was perceived to be too soft on deviationists by some members, such as Stalin and Molotov. In any case, all of the

[49] On this point, see Chapter 6 in (Hawkins, 1970). About Luzin's stay in Paris see (Demidov, Parshin and Polovinkin, 1989) and (Graham and Kantor, 2009).
[50] (Kagan, 1910).
[51] (Kassof, 2004; 64).

members of the board obviously claimed to be orthodox Marxists and, in general, were at the top of the State. Meanwhile, the GSE was supervised by members of the "old guard" of the Bolshevik party, and were often even close acquaintances of Lenin. It is remarkable that so few members of the editorial board were academics, though they were all intellectuals (sometimes, self-made intellectuals). The interest in economy and technique—emphasized in the preface as mentioned earlier—is visible in the choice of the participants. It is a significant sign of the violence of Soviet politics in the 1930s that, out of the 14 members of the board, seven were eliminated (in general, they were shot during the repression years of 1937 and 1938). This proportion is made all the more dramatic by the natural deaths of three members before 1932 and the worst of Stalinist repressions. N.I.Bukharin, V.V.Kuibyshev, L.N.Kritzman, V.N.Miliutin, N.Osinskij, E.A.Preobrazhenskij, and K.Radek were executed during these years. Moreover, one member of the board, G.I.Brojdo, was condemned and sent to a camp, but had the exceptional fortune of returning after Stalin's death.

60,000 exemplaries constituted the printing of the first edition of the GSE. As already mentioned, Shmidt opted for an encyclopedic dictionary and the publication of the volumes was to be in alphabetical order. While, initially and until the 1928 publication of volume 11, the alphabetical ordering system was almost respected, things became rather chaotic afterwards.[52] Some people, for instance, were deprived of a decent entry in the GSE. Consider, for example, Egorov, who was deemed to be politically suspect and who would die in exile in 1931.[53] The very short article on Egorov—published in 1932, only one year after the mathematician's death—is deeply derogatory, mentioning that his mathematical achievements were not important and that he was, above all, representative of the reactionary Moscow mathematical school (to which we shall return in the third part of this paper in a commentary on Bugaev). Indeed, Ergorov probably would not have had any entry at all if he were still alive.

These pressures from the political sphere after 1929 obliged the members of the board to adopt a considerable degree of flexibility in their short-term policy. Each volume published before 1931 included a table of contents, but, suddenly, in volume 21, this table disappeared in order to better facilitate last-minute changes in the contents of the volume. In volume 21, the table itself was probably suppressed at the last minute, as indicated by the absurd beginning of the volume on column 17, which reveals a six-page “hole”.

It is amazing to observe that even after the Stalin era ended, facing such an enormous amount of information as the one provided by the encyclopedia remained a challenge for a regime wanting strict ideological control of all publications. As late as 1960, historian of book editions F.N.Petrov, for instance, was careful when he explained who should read the first edition of the GSE.[54] He wrote:

> *The first edition of the GSE maintains its importance up to the present time by providing information. In its biographical and historical aspects, it can serve as a source of information for historians and researchers. But, one cannot recommend it for large circles of readers, as much of the materials are comprised of ideological and political errors that require changes.*[55]

Indeed, for Petrov, ideological aspects were inherent to the nature of the encyclopedic project. He wrote that the GSE "*contains assertions with a political and international*

---

[52] See (Kassof, 2004; 55-56) for the complete presentation of the erratic publication of the volumes along with the evolution of Stalin’s dictatorship.
[53] See (Ford, 1991), (Seneta, 2004), and (Graham and Kantor, 2009).
[54] (Petrov, 1960).
[55] (Petrov, 1960; 136)

character. Therefore, each formulation must be closely verified and must perfectly conform to the ideological and political problems of our country".[56] And, he openly claimed that "*the reader wants to receive methodological or political instructions* (установки) *based on Marxist-Leninist teaching in order to clarify events and facts occurring in nature and society*".[57]

Thus, the alphabetical order chosen for the publication of the volumes makes an analysis of the volumes of the first years all the more significant. To explain, one may perceive in it several ideological and scientific debates of the period 1925-1930 when a (very) relative freedom of speech still left some room for them to take place. It is clearly not in mathematics that the penetration of the ideological debates was the most obvious. But, in a way, this is also why it is so appealing to draw out the more or less subtle political implications in the entries about mathematics. And, it would certainly be a mistake to think that mathematics was spared altogether. Hayek commented in 1944:

> *Totalitarian control of opinion extends, however, also to subjects which at first seem to have no political significance. Sometimes it is difficult to explain why particular doctrines should be officially proscribed or why others should be encouraged, and it is curious that these likes and dislikes are apparently somewhat similar in the different totalitarian systems. In particular, they all seem to have in common an intense dislike of the more abstract forms of thought-a dislike characteristically also shown by many of the collectivists among our scientists. Whether the theory of relativity is represented as a "semitic attack on the foundation of Christian and Nordic physics" or opposed because it is "in conflict with dialectical materialism and Marxist dogma" comes very much to the same thing. Nor does it make much difference whether certain theorems of mathematical statistics are attacked because they "form part of the class struggle on the ideological frontier and are a product of the historical role of mathematics as the servant of the bourgeoisie", or whether the whole subject is condemned because "it provides no guarantee that it will serve the interest of the people". It seems that pure mathematics is no less a victim and that even the holding of particular views about the nature of continuity can be ascribed to "bourgeois prejudices". According to the Webbs[58] the Journal for Marxist-Leninist Natural Sciences has the following slogans: "We stand for Party in Mathematics. We stand for the purity of Marxist-Leninist theory in surgery".[59]*

Of course Hayek also had a political agenda when he wrote *The Road to Serfdom* in 1944, a book that included anti-communist and market libertarianism propaganda. However, this evidently subjective aim does not remove all value from this striking quote about how ideological action rules over exact sciences in totalitarian regimes. It is true that the converse question is equally important: can we infer from the mathematical entries in the GSE that some mathematicians skillfully tried to instrumentalize ideology in order to support their specific scientific approach? This is a difficult question because mathematics is not a subject in which personal opinions are immediately apparent even when they are directly instilled.

---

[56] (Petrov, 1960; 134)
[57] (Petrov, 1960; 135)
[58] Sidney (1859-1947) and Beatrice Potter (1858-1943) Webb were economists and socialists in London. They participated in the foundation of the London School of Economics.
[59] (Hayek, 1944; 165-166).

Moreover, as explained earlier, during the first years of its existence in the "liberal" context of the NEP, the authors of the GSE largely worked as they have always worked. Few mathematicians went as far as Pavel Nekrasov when he tried in 1902 to justify a hypothesis in a mathematical theorem (the "necessary" independence of random variables to deduce the law of large numbers) by a metaphysical-religious explanation based on free will.[60] Therefore, it is probably above all in later years that one can detect how some authors may have tried to use ideology for their truly scientific agenda rather than simply including some conventional sentences referring to Marx or Lenin at the beginning of their articles as proof that they were in line with the ideological framework of the time. A striking example of this direction may be found in the long entry "mathematics" (*математика*) by none other than the star mathematician Kolmogorov. It is far beyond the scope of the present paper to provide a complete analysis of this complex article, first, because it belongs to a completely different period (it was written in 1937), and, second, because it would deserve an independent study in itself. Let me therefore only give some brief comments about how Kolmogorov used ideological tools to build his personal conception of mathematics not unlike in the art world, where the composer Shostakovitch needed to adopt a day-to-day attitude of reconciliation between his artistic freedom and Stalin's order to be an "engineer of the soul" legible to every Soviet citizen. As Vucinich already observed,[61] as early as 1925, the 23-year-old Kolmogorov published a paper[62] about mathematical logic in which he succeeded at bringing "*intuitionism closer to Soviet mathematical thought*", making it "*both a basis for further elaboration and a springboard for general criticism of logicism and formalism*". We shall also mention in the next section that Kolmogorov was anxious to explain that his axiomatic approach to probability did not contradict an objective algorithmic frequency approach of the von Mises type. The axiomatic approach only had the advantage of reasoning over abstract objects without taking into account their specific nature, but the meaning and interpretation of the operation were only possible through the frequency approach. We find several instances of such an approach in Kolmogorov's entry. On columns 386-387, inside a section devoted to mathematical abstraction and commenting on the various conceptions of numbers, he wrote:

> *The most recent developments in mathematics have showed that the principles governing cardinal and ordinal numbers are radically different: applied to infinite sets of objects, they lead to two absolutely different arithmetics of ordinal and cardinal numbers. (…) Why is it that, inside mathematics itself, in the case of finite sets, the difference between ordinal and cardinal natural numbers somehow disappears? A reliable answer to this question is really essential if we do not want to become prisoners of idealistic conceptions of mathematics. The subjective idealist tells us that cardinal and ordinal numbers are designed by the same symbols 1,2,3,4,5,6,7,8,…, and that arithmetic only deals with this sequence of signs. But, the objective idealist tells us that numbers, like every being that is independent of the material world, are neither cardinal nor ordinal. The materialistic answer to this question is the following: arithmetic does not study isolated numbers (изолированно отдельные числа), but mutual relations between numbers, or, in other words, the internal properties of the system of numbers.*

[60] See (Seneta, 2004).
[61] (Vucinich, 1999; 112).
[62] (Kolmogorov, 1967).

Kolmogorov then explains that the two systems of ordinal and cardinal natural numbers are in fact isomorphic so that "*pure arithmetic indifferently studies the system of cardinal numbers or the system of ordinal numbers*". And, he concludes, "*We climbed to the second level of abstraction: some systems of forms and relations of the real world must be studied from the point of view of the form of the system itself*" (*рассматривается с точки зрения своей формы*). This illustrates Kolmogorov's attempt to walk the tightrope between accusation of abstract idealism and concession to drastic materialistic conception.

III - Some aspects of the first mathematical entries in the GSE

The final part of this paper considers the complex debates in the field of mathematics during the NEP period. This will be done by examining four entries published in the first volumes of the GSE, all of which are connected to the question about the status of the calculus of probability and its use in the scientific approach to reality.

1- The mathematics of randomness in USSR in the 1920s

Since the end of the 19th century, two approaches to probability coexisted in Russia. One was developed in Moscow by Pavel Alexeevitch Nekrasov (1853-1924) in the framework of Moscow Philosophical and Mathematical, a school with a strong metaphysical and political background that was created by Nekrasov's master Nikolai Vasilievich Bugaiev (1837-1903) (on which we shall comment later). [63] The other school was developed in Saint Petersburg after Chebyshev by his disciples Markov and Lyapunov. It distanced itself from any metaphysical interpretation and often emphasized application. More significantly, Markov himself was a constant and vocal opponent of the Czarist regime. Markov's violent hostility towards Pavel Nekrasov—and, in particular, towards Nekrasov's conceptions of probability—is part of the pre-revolutionary Russian mathematical scene and played a role in the modeling of an acceptable probabilistic theory in the Soviet Union.[64]

In the communist society under construction in the 1920s, discussions about the right place to give to randomness—and to its scientific measure—were an important theme of reflection and exchange. The central issue was not the mathematical theory in itself, but the conditions of its implementation in the study of societal phenomena. Indeed, the economic primacy resulting from the Marxist social conception led to the question of what margin of randomness was left politically admissible when the means of production were supposed to be under the absolute control of the State. In the economic sciences, any movement beyond strict deterministic models was considered with a priori suspicion and essentially related to the existence of a market where private actors could speculate. For sure, it was a curious aspect of Soviet science in the 1920s and 1930s that the mathematics of randomness drew both blatant praises and harsh criticisms. Mespoulet[65] provides a detailed account of the defeat of statisticians at the end of the 1920s. According to Mespoulet, statisticians could not impose their methodology on party organizations searching for figures of production matching their political agenda of planification, and this often resulted in hard personal consequences for

---

[63] Moscow Philosophical and Mathematical school has been the object of examination for a long time See, among others, (Ford, 1991), (Seneta, 2004), (Graham and Kantor, 2009). The most complete picture, including a profound study of the controversial personalities of Bugaiev and Nekrasov with the author's particular emphasis on their anti-Semitic views, **may be** found in (Svetlikova, 2013).

[64] See (Seneta, 2003).

[65] (Mespoulet, 2001).

these statisticians. In another direction, the well-known and dramatic debates surrounding Darwinism and genetics in the 1930s and the emergence of lissenkoism were basically related to questions about the role of randomness in genetics.[66]

It is worth noting that the debates of the 1920s took place even in the ranks of supporters of the regime. An instance of this may be found in the harsh exchanges between Kol'man and Orlov in the journal *Under the banner of Marxism* mentioned earlier. The debates were also amplified by reflections about axiomatization. During the 1920s, Soviet mathematicians felt it necessary to prove that mathematics was not merely an "empty" formal game. A.Ya.Khinchin, for instance, wrote an article in *Under the banner of Marxism*[67] emphasizing the importance of this "battle for the object" in modern mathematics. Khinchin[68] explains how Weyl and Brouwer—when they wanted to "*pitilessly expel everything that hides its emptiness under the veil of a perfect logical outside from mathematics*"—did not simply wish to prove how some contemporaneous approaches to mathematics were pointless. Rather, Khinchin explains that they wanted to illustrate "*a deep inner illness*" of contemporaneous approaches to mathematics. In the Soviet society under construction, formalism was beginning to be treated with a great deal of suspicion.[69]

As we have seen when commenting on the debate between mechanists and Deborinists, scientists in the 1920s expressed various opinions in response to these questions. They often used a variety of arguments to prove that they did not contradict Marxist-Leninist dogma and that they were not too close to an idealist conception of mathematics. This was sometimes an attempt to protect themselves from potential accusations of being too close to the activity of unreliable scientists with religious backgrounds, such as those in Moscow.

During the Stalinist turn of the 1930s, even a star mathematician like Kolmogorov felt it necessary to make rhetorical efforts to convince his readers that he considered probability theory from the perspective of a mere mathematician concerned only with its mathematical aspects, though he was plainly conscious of the fundamental importance of interpretation, connection to the real world, and practical application of his research. He declared to leave these aspects to other, better-equipped researchers. For instance, in the introduction of his fundamental paper on the analytical approach to Markov processes, he wrote:

> *It should be noted that the possibility to apply the schemes of deterministic or stochastically defined processes for dealing with any real process has no connection with the question of whether this actual process was itself deterministic or random.*[70]

2- Comments on four entries

Several entries in the GSE that deal with randomness and its scientific estimation provide good insight into the debates surrounding probability in the Soviet Union. However, there is another reason to examine the four articles on which we shall comment. The corresponding words in Russian all belong to the beginning of the alphabet and due to the alphabetical ordering system, these entries were therefore published around 1926 in the very first volumes of the encyclopedia, which were still released in alphabetical order. Two entries are biographical notes about two mathematicians: one dead and Russian, the aforementioned

---

[66] (Krementsov, 1997)
[67] (Khinchin, 1926).
[68] (Khinchin, 1926; 184).
[69] For details on these questions, see (Verburgt, 2016).
[70] (Kolmogorov, 1931; 3)

Nikolaï Vassilievich Bugaïev (*Бугаев*), the other a living foreigner, Emile Borel (*Борель*). The two other entries concern fundamental theoretical aspects: the law of large numbers (*Больших чисел*) and probability (*Вероятность*). Above all, the following comments aim to illustrate the kind of balance the authors had maintained between their scientific freedom and their necessary adaptation to political circumstances.

a- Nikolaï Vassilievitch Bugaiev *by V.F.Kagan*

The entry on Bugaiev provides an interesting example of how, before the harsh, one-track thinking of 1930s Stalinism, it was still possible to write a balanced text about a contemporary and rather politically unacceptable (according to Soviet standards) mathematician. For sure, two characteristics helped: Bugaiev was Russian, but, above all, he had the *luck* to be dead. At the same time, Bugaiev's student and close friend Egorov began to be treated like a leper. It was Kagan himself, the head of the encyclopedia's section on science, who took charge of the text about Bugaiev. This may have also been an attempt to moderate the "necessary" expression of hostility against him. Indeed, it may have been more violent if the article were written by a second fiddle wanting to give hints of submission to the regime.

Bugaiev was one of the founders of the Philosophical and Mathematical school of Moscow. Several of its members had deep connections with religious circles. For instance, it is in this school that a personality such as Pavel Alexandrovich Florensky (1882-1937) studied at the beginning of the 20th century.[71] Bugaiev created a new discipline he called "arithmology," which may be defined as a science of discontinuous functions attempting to represent the world in a richer way than Newtonian cosmology. Probabilities entered Bugaiev's system as an essential tool for going beyond arithmology. In his conference of the first International Congress of Mathematicians in Zurich in 1897, for example, Bugaiev declared that "*probability theory must give answers when one cannot use analysis or arithmology, when we ignore the law of phenomena*".[72] One reads the following in Kagan's article:

> *[Bugaev] believed that the doctrine of non-continuous functions should constitute a great discipline that he called "arithmology", which, he thought, would cover all of mathematical analysis by taking over infinitesimal calculus. However, the studies performed by Bugaiev provided no reason for such broad generalizations. Meanwhile, Bugaiev made these views foundational to his philosophical worldview, leading to the following. Determinism has its source in infinitesimal calculus. Laplace located the justification of determinism in the existence of integrals of the differential equations of motion. But, Laplace and his followers could not have known arithmology, which makes explicit the fact that there are jumps in nature and contradicts the doctrine of the determinists. On this basis, Bugaiev exposed deeply held metaphysical beliefs and, together with his students, the most active of whom was professor P.A.Nekrasov, he created a whole school of philosophy with a clearly metaphysical direction in Moscow,*

[71] A narrative description of the "Russian Trio"—Egorov, Florensky, Luzin—can be found in chapter 4 of (Graham and Kantor, 2009). About Florensky's attitude towards mathematics, an excellent survey is given in (Betti, 2009).

[72] (Bugaiev, 1898; 219-220)

> *which had a great influence not only on mathematics, but also in wider circles of Moscow scientists. Several representatives of the "school" conceived these philosophical deductions in relation to political views of a clearly reactionary nature. First-rate Russian mathematicians, such as P.L.Chebyshev, N.A. Korkin, and A.A.Markov, were not inclined towards these metaphysical constructions. They proved their inconsistency and did not even recognize such a thing as "arithmology".*

b- Emile Borel *by N.Luzin*

The mathematician Emile Borel benefited from a rather long entry in the first edition of the GSE, a noticeable fact for a living and non-Soviet personality, as a strong pan-Russian (or at least pro-Soviet) tendency can be observed in the general economy of the publication. One may think that Borel's conceptions about the role of a mathematician in the city and his opposition to the most formalist aspects of the domain (Mazliak and Sage, 2014) made him a reputable person. A sign of this favoring is the series of translations of books by Borel published during the NEP period, including his well-known book *Le Hasard* (Randomness),[73] which was considered by Borel to be a survey of his conception of the mathematical approach to randomness.[74] However, there was a negative review of the book by Orlov in the journal *Under the banner of Marxism*.[75] Orlov was highly critical of Borel, claiming that his "*reflection suffers from vagueness and typically petty bourgeois limitations* (расплывчатость и специфически мещанская ограниченность) *so that one cannot find any value in it*". Orlov's central attack on Borel's approach was the claim that he totally misunderstood dialectics because he "*does not know that truth is always concrete*". Orlov continues, "*He looks for abstract and metaphysical solutions to practical problems*".

Kagan asked Luzin to write the entry on Borel. As already mentioned, Luzin had followed Borel's lectures in Paris before the war and with his master Egorov and other students. Furthermore, he was a passionate follower of French mathematical works on the theory of functions (Borel, Lebesgue…), which culminated in a series of important results during the 1910s. In 1917, Luzin had founded a seminar, the famous group Luzitania, which focused on these questions at the university of Moscow, where in the 1920s many future stars of the Soviet mathematics, such as Khinchin and Kolmogorov, made their first steps.[76]

In his article, Luzin underlines that Borel was one of the first to understand the importance of Cantor's works, but also to warn his fellow mathematicians against the risk of a possible drift resulting from such a purely logical approach. Luzin writes that Borel was ultimately positive about Cantor's theories

> *when these ideas were met with total disbelief. He first applied them for research on functions (Heine-Borel's theorem). However, with his inherent tendency towards classical simplicity and concreteness, Borel warned scientists against their attraction to purely logical constructions of infinite sets without an analysis of their relationship to reality. Borel's considerations («Illusion du transfini») were not understood well in the beginning, but further development of the theory of functions attracted the general attention of mathematicians to them.*

---

[73] (Borel, 1923).
[74] See (Bustamante, Cléry and Mazliak, 2015)
[75] (Orlov, 1923).
[76] A narrative description of Egorov and Luzin's links with France and of the creation of Luzitania is the theme of large sections of (Graham and Kantor, 2009). See in particular Chapters 4 and 6.

Luzin also mentions the wide selection of fields in which Borel was involved, with a special emphasis on probability:

> *Borel is keenly interested in many problems of mathematical physics and, in particular, the theory of probability, a field in which he has begun to publish a series of monographs.*

Clearly, in spite of what Orlov may have written in the review mentioned earlier, a realization like *Treaty of probability and its application*—launched by Borel in 1922[77]—could not really be suspected of any strongly idealistic tendency. Borel was thus accepted at the time because he reasonably fit into the main Soviet paradigm in science. Moreover, his political commitments (in particular, at the Society of Nations with the Institute of Intellectual Cooperation[78]) would make him very careful to maintain contact with Soviet scientists, especially after 1928 when he was the head of the Institut Poincaré in Paris. He did his best during the 1930s to invite Soviet mathematicians to Paris. He had relative success at the beginning of the 1930s, but remained helpless when Stalin decided to close the borders of the country.

c- Law of large numbers *by M.N.Smit-Falkner*

Economist Maria N. Smit-Falkner authored the third entry I examine. She had been a convinced Bolshevik since 1907 and studied some years at the London School of Economy before the Revolution. There, she met the British economist and statistician Arthur Lyon Bowley (1869-1957) and would remain in contact with him afterwards. Smit-Falkner's tense relationship with the world of statisticians in the USSR has been studied by Mespoulet[79]: she was the head of the Department of the Supreme Council for National Economy between 1918 and 1920 and then became a professor of national economy at the Institute Plekhanov. Mespoulet exposes how Smit-Falkner was convinced that industrial production's principles of rationalization were transferable to statistical activity. She wrote:

> *For the numerous processes of the recollection and treatment of data, the rationalization of work and the introduction of assembly-line work (коонверизация) must play a significant role in reducing the waste in work. Until now, we have almost not had any norm for productivity and no system for the decomposition of statistical operations similar to the assembly line.*[80]

The long article that Smit-Falkner wrote for the GSE about the law of large numbers is oriented towards political economy both in the examples she presents and in the interpretation of its results. For Smit-Falkner, statistics is useful when dealing with characteristics unevenly distributed in a collective. An example is given by "the *cultivated area of a peasant household*," which can be of extremely variable dimensions, and sometimes even *"it is equal to zero (households without lands)"*. Another example is given by *"the number of workers"* that changes greatly from plant to plant.

Moreover, Smit-Falkner's text offers a striking example of how the rhetoric of the excommunication of undesired people (here, members of the party)—called by the sinister

[77] See (Bustamante, Cléry and Mazliak, 2015).
[78] See for instance (Guieu, 1998).
[79] (Mespoulet, 2001; 292-293).
[80] (Smit-Falkner, 1927; 15-30).

term of "purge," which was so frequently used during the next decade and became synonymous with capital punishment—could be located in any kind of text, including even an entry about a mathematical theorem in an encyclopedia:

> *In order to know the composition of a whole mass, it is necessary to measure its totality or a sufficiently large part of it so that, within this part, the connections that are present in the whole mass will appear. For instance, when a purge (чистка) of the party is decided, the ratio between the number of members subject to exclusion and those not subject to exclusion in the individual cells can be very different. In some cells, one kind of party member prevails; in others, another kind, and only by increasing the number of tested cells, it is possible to refine the composition of the party as a whole.*

There is, of course, a risk of installing a teleological bias when linking different moments in Soviet history (for instance, the NEP and the *Ejovtchina* of the years 1937-38), in which circumstances were very different. Obviously, the word purge (*чистка*) was probably not perceived in the 1920s as it would be in the 1930s. Its first appearance in the Soviet political vocabulary seems to be in an article in *Pravda* on 27 June 1921 in which the Central Committee published a statement calling for the "cleaning of the party" (*Об очистке партии*), drawing particular attention to members belonging to the former bourgeois intelligentsia. Afterwards, the word was regularly used in various contexts. It seems that Koselleck's *Geschichtliche Grundbegriffe* does not include this concept or one closely related to it, but Koselleck's categories of *extralinguistic* or *prelinguistic* aspects[81] may allow us to detect the potential violence contained in the word. In her celebrated study (Douglas, 1966), Douglas had examined how the concept of purity was a sign of a war of the social system against itself.[82] A good example of a scientific aspect of this war may be seen in the development of eugenics at the turn of the 20th century. In Soviet society, where a scientific approach was proclaimed to be the official doctrine of social questioning, the use of the word "purge" in Smit-Falkner's entry cannot be merely rhetorical. Smit-Falkner, in other words, wanted to prove that science (here, the law of large numbers) provides support for the management of party affairs. We also see a comparison made with Darwin's work later in the entry.

The economic value the author attributes to the law of large numbers is observed most notably in her recurrent use of illustrations drawn from economic life. For Smit-Falkner, "*the level of labor productivity of an entire set of factories and plants generally reflects the overall level of development of productive forces and the cultural skills of workers. But, some factories can either keep up with the general level or, conversely, go ahead of it*". Naturally, Marxist dogma was conveyed whenever possible. Smit-Falkner, for instance, quotes a passage from Marx's *Capital*, which asserts that "*the laws of the production of value are only fully realized for the individual producer, when he produces as a capitalist, and employs a number of workmen together, whose labor, by its collective nature, is at once stamped as average social labor*". This appeal to Marx was not only ideological; it was also (and perhaps above all) a weapon to disqualify classical—that is, *bourgeois*—statistics supposedly in service of capitalist oppression. Smit-Falkner attempted to oppose a kind of idealistic statistics apparently relevant only for hazard games in which conditions remain constant to the statistics needed in an economy where such conditions do not prevail:

---

[81] See in particular (Koselleck, 2002) Chapter 2 on Social History and Conceptual History.
[82] See in particular (Douglas, 1966), Chapter 9.

> *When it formulated the law of large numbers, the classical theory of statistics did not rely on the observation of some social mass subject to change, but on the observations of cards, dice (gambling), or urns with black and white balls. Through a large number of repeated draws of balls from the urn (if the drawn ball is put back each time), it is possible to prove that the number of black and white balls in the urn is identical. (...) At any time or place, this formulation is absolutely correct, as the black and white balls, returned to the urn after the conclusion of the experiment, are not subject to any influence from the outside; hence, the resulting ratio is persistent in time. But, in real and, especially, in social collectives, this cannot take place. The composition is subject to continuous change in time. The party members do not return to the party, as do black balls to the urn. (...)*

Here, Smit-Falkner contrasts how Darwin's work discarded the conception of plant and animal species that were fixed and established once and for all and how Marx's work had subtracted eternal, immutable economic categories from political economy and *permanences* and Süssmilch's divine order of things from statistics. Modern Marxist statistics, she comments, always deals with the study of phenomena in the process of their formation and *'use the law of large numbers for the study of certain collectives in each given period of time, and there is no such a thing as a timeless effect of the law'*. She concludes:

> *The relations obtained in collectives are not treated by modern statistical theory as a kind of "natural law" or as some "logical constant." Even when the composition of a collective, observed at different time periods, is relatively stable, we are dealing with slow change rather than with stability and with an empirical constant rather than with a logical one.*

d- Probability *by A.Bowley and A.A.Khinchin*

The last entry we shall examine is "probability". The article is divided into three parts: "Mathematical foundations of the theory of probability", "Calculus of probability", and "Application of the theory of probability". The second part, which contains more technical information, was written by the young Aleksandr A.Khinchin (1894-1959) who had only recently begun his work on probability (almost at the same moment as Kolmogorov, who was nine years younger). Interestingly, at the same moment, Khinchin and Kolmogorov published their only co-authored paper[83] dealing with the convergence of series of random variables. Khinchin wrote a fairly unoriginal text consisting of four sections: "Origins and development of the calculus of probability", "Probabilities of compound and independent events", "Probability of hypotheses and Bayes rules", and "Continuous probabilities". In the lattermost section, Khinchin presents a short exposition of the Bertrand paradox in order to emphasize the need for a clear setting of the random experiment before any calculation could take place.

The two other parts written by British statistician Arthur Lyon Bowley are more significant. This point is not minor because, generally speaking, few foreigners were called to contribute to the GSE. In the absence of archival material, it is difficult to know how Bowley—who translated his contributions—was asked to participate to the GSE and if they were specially ordered by the GSE. However, as we have already mentioned, Smit-Falkner

[83] (Khinchin and Kolmogorov, 1925).

had been Bowley's enthusiastic student in London, so it is plausible that she recommended him to write the entry. Though he was not a communist, and, to my best knowledge, did not at all publicly express a positive opinion of Bolshevism, Bowley may have been asked because he had been one of the first to articulate a statistics about the working class and its conditions for living.[84] Additionally, Bowley was an adamant supporter of using mathematics in the economy. To this end, he published a remarkable textbook of mathematical statistics for economics students.[85] In a famous letter, his colleague and friend the economist Alfred Marshall (1842-1924) teased him for this. Marshall wrote that he had "*a growing feeling in the later years of [his] work at the subject that a good mathematical theorem dealing with economic hypotheses was very unlikely to be good economics*" and even advised economists to "*burn the mathematics*".[86] Bowley's opinion was precisely the opposite and he positioned the mathematical treatment of social problems against the subjectivity of more discursive forms. Given his interest in social problems and the mathematical orientation of his works, it is unsurprising that he was accepted in the Soviet Union during the liberal times of the NEP.

Although Bowley's treatment of the two parts was not particularly engaged, one nonetheless observes the emphasis he almost exclusively gives to the frequentist approach. The application of the calculus of probability is legitimate only in the context of the law of large numbers. This approach, formalized in particular by the German mathematician Richard von Mises (1883-1953) at the beginning of the 1920s, was considered to be the only one not contaminated by idealism. This is not the place to give a full account of von Mises's complicated theory of collectives.[87] Roughly speaking, von Mises's idea was that the calculus of probability is relevant only for dealing with the infinite repetition of a particular experiment. Such an infinity is mathematically represented by a sequence of issues—a *collective*. Furthermore, the issues belong to a given set of possible issues and the frequency of each issue remains constant in every subsequence. More relevant to the present paper is the fact that von Mises was a declared positivist in the troubled context of Weimar culture. In his profound study of Weimar scientists, Forman[88] explains how many physicists looking for an adequate alternative faced the Spenglerian negative perception that implied the disappearance of causality in science. For von Mises, the theory of collectives, providing a sound basis for the expression of probability, was such an alternative.

It is remarkable that Weimar Germany—alongside the Soviet Union—was the place where the meaning of probability theory was most discussed in the 1920s and von Mises's approach greatly contributed to this point. It was largely discussed during the 1920s in the Soviet Union. Siegmund-Schultze[89] offers some elements about the reception of von Mises's collectives in Russia. Khinchin was very interested in von Mises's theory, which had a fundamental influence on him. Indeed, he considered it to be an 'extremely fruitful natural philosophical approach', though he nevertheless criticized it as representing a possible step towards an idealization of the concept of probability. Von Mises found a convinced supporter in Boris Mikhailovich Hessen (1893-1936), one of the main theorists of dialectical materialism in physics.[90] Hessen wrote a paper to explain[91] how von Mises's theory of probability gave a sound basis for the application of the statistical method in physics,

---

[84] See for instance (Bennett-Hurst and Bowley, 1915).
[85] (Bowley, 1907).
[86] (Ekelund and Hebert, 1999; 362)
[87] The interested reader should refer to (Von Plato, 1994) Chapter 6, where the theory of collectives is presented it in detail
[88] (Forman, 1971).
[89] (Siegmund-Schultze, 2004)
[90] Hessen's proximity to von Mises is exposed in (Pechenkin, 2010) section 6.4, p.97.
[91] (Hessen, 1929).

protesting Khinchin's comments. In his recent paper, Verburgt[92] exposes the differences between Khinchin's and Hessen's conceptions about the Marxist orthodoxy of von Mises's approach. In his *Grundbegriffe*,[93] Kolmogorov carefully insisted that he shared von Mises's frequentist point of view because it empirically justified axioms that are only more manageable mathematical abstractions. He wrote:

> *The reader interested only in the purely mathematical development of the theory [of probability] may not read this section (…). In this section, we limit ourselves to a simple presentation of the empirical origins of the axioms of the theory of probability and voluntarily leave aside important philosophical questions about the understanding of probability in the experimental world. To present the necessary hypotheses for applying the theory of probability to the world of real events, the author mostly follows von Mises's reflections (…)*[94]

Again illustrating the complicated destiny of the intelligentsia in the 1930s, Hessen was executed in 1936. Khinchin and Kolmogorov had some difficult days during the so-called "case of Luzin" in the same year.[95]

Let us conclude this section by mentioning that the references given by Bowley include three modern Russian textbooks: (Markov, 1924), (Bernstein, 1927), but also (Lakhtin, 1924) by Leonid Kuz'mich Lakhtin (1863-1927), who was a representative of the Moscow mathematical school that had just published his lectures. Of course, Markov was dead, but it is nevertheless natural to try to understand why the board chose the foreigner Bowley for the entry instead of Lakhtin or Bernstein. The opposition to the general approach of the Moscow school already mentioned when we commented on Bugaiev may be a reasonable hypothesis why Lakhtin was not suitable. A brief consideration of Lakhtin's past activity helps prove this hypothesis. In 1905, Lakhtin was just appointed as the rector of Moscow University where he had to face revolutionary unrest and the closure of the university. He subsequently resigned in August 1905 when the university was granted the right to elect its rector.[96] For Sergei Natanovitch Bernstein (1880-1968), the situation was somehow different. He was of an intermediate generation and had received his mathematical education in Paris and Göttingen. In the 1920s, he stayed in Paris several times and was possibly close to migrating there. Bernstein was always a sort of outsider within the Soviet mathematical scene, but his exceptional international reputation seems to have protected him during his long career, during which he stubbornly refused to be involved in any political commitment. For instance, it is surprising to read the transcription of the 1936 meetings dealing with the aforementioned case of Luzin[97] because it shows how Bernstein seems to have had a certain latitude of speech that enabled him to defend Luzin. Moreover, before 1933, his position was in Khar'kov. Perhaps Kagan was a bit frightened to work with this obstinate colleague—or Bernstein did not want to collaborate with the GSE.

Apart from these Russian sources, the literature includes Bowley's own book (Bowley, 1907) and the textbooks (Poincaré, 1912), (Czuber, 1914), (Castelnuovo, 1919), and (Lévy, 1925). If Poincaré (whose first edition was published in 1896) and Czuber (whose first edition was published in 1903) were classical references at the time and Castelnuovo's book was

---

[92] (Verburgt, 2106).
[93] (Kolmogorov, 1933).
[94] (Kolmogorov, 1933; 3).
[95] See (Demidov and Lëvshin, 2016).
[96] See (Lëvshin, 2002).
[97] (Demidov and Lëvshin, 2016).

considered to be the most recent and complete presentation of basic probability theory, the mention of Paul Lévy is remarkable. Lévy had only recently begun his works on probability, which had not received much attention from his French colleagues. However, Soviet mathematicians, such as Bernstein, Khinchin, and Kolmogorov, closely followed his publications.[98] It may be Khinchin who had advised Kagan to add the reference.

Conclusion

During the Central Committee meeting in July 1928, Stalin explained that the NEP was at a dead-end and that he was considering requiring peasants to provide the efforts needed to support a rapid industrialization of the country. With these words, the swift conclusion of the NEP was sealed; at the same time, they pointed to the headlong rush towards the violent years of the collectivization that marked the beginning of the 1930s. Frightened by the perspective of terror implied by Stalin's words, Bukharin attempted to resist by publishing on 30 September 1928 an article in the *Pravda* entitled "Notes of an economist," in which he tried to prove through scientific analysis that the projects of creating kolkhozes and of the general planification of economy were extremely risky. Stalin obviously would not listen and decided to go forward with these projects. Bukharin had, in fact, signed his own death sentence. As early as 1929, he began to gradually lose all of his official positions until his complete isolation and elimination in the 1930s. He was one among thousands of academics and specialists who began to be repressed in the so-called Great Break of the years 1928-1931. The nightmare had begun.

By the end of 1928, tensions were gradually increasing and the regime began to orchestrate a violent campaign against "bourgeois specialists". A fascinating picture of how the old specialists were forced to face Stalin's Great Break is provided in (Loren, 1996). In chapters 3 and 4, one sees how engineers of the "old school"—who predicted the failure of the gigantic industrial projects of the Plan—were accused of anti-Soviet sabotage. One also sees how fear began to be the primary feeling amongst the intelligentsia.[99] The specific aspects concerning mathematics have already been studied several times.[100]

The Great Break could not spare an enterprise such as the GSE. Shmidt's choices for the authors and the composition of the editorial board placed the GSE in a prime position to be under attack when ideological tensions intensified in the early 1930s. Because this obviously hurt the editorial board—which, as we have seen, mainly consisted of high-ranking Bolsheviks of the Old Guard—one might infer that, on an "intermediate" and more technical level, the situation would have been rather tame. But, this was not really the case: "*while the GSE was not dissolved as an entity, Shmidt and other top editors came under considerable pressure. They responded by instigating a massive editorial purge*".[101] Such was the case for the science section of the GSE.

In 1929, the journal *Natural science and Marxism* was founded under the direction of Shmidt to be an extension of the Soviet encyclopedia with more room for debates. The journal was devoted to the study of natural sciences from a Marxist point of view. In 1931, Kol'man replaced Shmidt and the journal was re-named under the title *For a Marxist-Leninist natural science*. In its first issue, the journal declared war on Shmidt. For instance, his choices for the GSE were violently opposed in an article by Alexandr Alexandrovich Maksimov,[102] who

---

[98] See (Barbut and al, 2014).

[99] For a general overview **of** this question, consult for instance (Krementsov, 1997) or (Bailes,1978) (in particular, Part II, pp.67 *et seq*.).

[100] See, in particular, (Tagliagambe, 2003) (in particular p.88), (Vucinich, 2000), or (Seneta, 2004)

[101] (Kassof, 2004; 69).

[102] (Maksimov, 1931) - see especially p.73.

asserted that the "*science section of the GSE must be considered anti-Marxist. (…) The errors made in choosing the authors must be related to the ideological errors*." Even more significantly, in 1931, the Gosizdat published a book with the unambiguous title "The Fight for a materialistic dialectic in mathematics," which contained a collection of papers devoted to the question of whether the mathematical sciences needed an ideological correction in the USSR. It concerned every field of mathematics, including, besides, the history of mathematics. Sonia Alexandrovna Yanovskaya (1893-1966)—who, for some time had become Kolman's companion and a sort of guard dog for the ideological purity of Soviet mathematics—composed a long article (Yanovskaya, 1931) concerning mathematics in the GSE. Her attack was specifically focused on Shmidt, as editor-in-chief, as well as a mathematician. She wrote:

> *In front of us is the entry about algebra by the editor-in-chief of the GSE, comrade Shmidt. We must have great expectations of him, as editor-in-chief and as a specialist of this domain of mathematics. However, his entry does not differ from the other entries on mathematics in the GSE written by liberal professors absolutely not involved in politics (сугубый беспартийный). One cannot qualify it as anything other than clearly Machist and Bogdanovian. In complete agreement with Mach, Shmidt deals with algebra not as a science of links and laws of the material reality of a particular type, but as a practical language. The successes of mathematics are not explained by the fact that it correctly represented (and therefore understood) the character of some of the simplest physical and mechanistic laws, but by the fact that it provided a convenient symbolics.* (Yanovskaya, 1931. p.306)

Yanovskaya then called for Lenin's writings to support her attack. Lenin wrote in his well-known polemical book *Materialism and Empiriocriticism*[103] that contrary to the materialist, the "solipsist" (one of the numerous designations for Mach's followers) considers anything to be a success when it is appropriate to deal with a practical case that one can consider separately from the theory of knowledge. She accused Shmidt of not comprehending dialectical materialism and confusing materialism with an empiricism of the Stuart Mill type. According to her, Shmidt interpreted the fact that changes in mathematics afford it the possibility of describing more and more complex relations of reality, as a relativity of mathematics. Moreover, she added that the literature provided in the entry refers exclusively to "*idealistic literature*", not only without the slightest attempt to evaluate it, but also without any mention of its idealistic character. Yanovskaya burst into a rage when Shmidt mentioned Hilbert: "*this same Hilbert who, without shame, transformed mathematics into a game with a fundamental understanding which forbids any real and concrete contents in it. Idealism under the mask of practicalism (делячество), this is the methodological point of this mediocre (also on its scientific aspect) entry*" (pp.314-315). Yanovskaya concluded her article with a threat:

> *The factual examination of the GSE has only begun. It is necessary to treat it with special care and as a large collective work, first, as a lesson for the future, and, second, as a way of correcting what has already been done. The main results of this examination must be included in the encyclopedia, in one or another form, in a second edition, by returning to questions already evoked in closely related entries, or by publishing special complements. We*

[103] (Lenin, 1947).

must remember comrade Stalin's statement that the correct, positive point of view is obtained through critique and fight.

In 1934, Kagan was replaced by Maksimov as the head of the section of science and by Kol'man in the section of mathematics, soon completed by Kolmogorov (both appear as responsible for mathematics in Volume 29, which was published in 1935). If the volumes published during the terrible years of 1937-38 (as volume 37) did not to include the list of those responsible for the sections, it nonetheless reappears afterwards. And, in volume 41 (published in 1939), Kolmogorov alone directs the section of mathematics with the help of Georgij Fedorovitch Rybkin (1903-1972) as a technical editor. The latter had just been placed at the head of the State publishing house for technical and theoretical literature (*Государственное издательство технико-теоретической литературы*), which was founded in 1939 as the new structure for publications in mathematics and physics. An obituary for Rybkin—published in 1972 in the journal *Uspekhi Matematicheskikh nauk*[104]—was signed by some of the major representatives of the Soviet mathematics of the time, including P.S. Alexandrov, B.V. Gnedenko, and A.N. Kolmogorov. This text is quite typical of the political correctness of the Soviet obituaries, and there is some irony in reading how Rybkin's swift access to his top position in the GSE in the 1930s is presented alongside his interests in dialectical materialism and "scientific atheism".

As commentators have often observed, the years of the NEP appear to have been a parenthesis of relative quietness between the period of the war communism and the beginning of the Stalinist dictatorship. During these five or six years, there was some room left for academic debate, at least in the domains that were not the most exposed to political interpretation. While, during the NEP period, there was no real freedom of speech when it came to strictly political matters and certainly no hint at all of an opening of the political debate to any party other than the communist party, on scientific questions, there was nonetheless the emergence of vivid debates—sometimes even within party structures.

This ambiguity makes the publication of the volumes of the GSE during these years all the more interesting because they allow for an understanding of the often-utopian thinking about science that dominated the Soviet Union during its first years. Moreover, the questions about randomness, as we have seen, acquired special significance in the classless society under construction because, through the prism of the primacy of the economy postulated by Marxism-Leninism—in which the state possessed all the control sticks of economic life—chance became secondary. This shift was happening at a time when the mathematical theory of probability was undergoing a profound evolution—both due to the problems concerning theoretical foundations and the creation of new concepts, such as stochastic processes and the study of new properties such as limit theorems. Consequently, new developments were proposed with regards to the mathematical theory of probability in the USSR, giving rise to an extraordinary proliferation of probabilistic studies in the 1930s. However, as we have already observed about Kolmogorov, careful steps were taken to remain distant from any question of "concrete" interpretation.

Kassof's wide-reaching study[105] was extensively used in the present paper, whose aim was only to focus on a specific aspect of the GSE. Such an immense source is worthy of many works and it is certainly my hope that historians of science, and in particular of mathematics, will conduct other inquiries into many other aspects of this enterprise. Easier access to primary sources, some of which Kassof had been able to exploit, would be of capital interest. Above all, it seems that the Stalinist period motivated a great deal of work about science in the USSR. On one hand, this is logical: the Stalinist dictatorship was a period of relative

[104] (Rybkin, 1972).
[105] (Kassof, 2004).

political stability. But, on the other hand, it was also a period of ideological glaciation. Thus, the previous period can provide a greater variety of information shedding light on the tendencies reigning among intellectuals who tried to adapt their work according to the new circumstances. I tried to explain how these tendencies can be perceived in the entries dealing with probability among the first volumes of the encyclopedia.

Bibliography

(Bailes, 1978) Bailes, K. E. (1978) *Technology and society under Lenin and Stalin: origins of the Soviet technical intelligentsia, 1917-1941*. Princeton University Press, Princeton.

(Bennett-Hurst and Bowley, 1915) Bennett-Hurst, A.R. and Bowley, A. L. (1915) *Livelihood and Poverty: a study in the economic conditions of working-class households*. G. Bell, London.

(Bernstein, 1927) Бернштейн С.Н. (1927) *Теория вероятностей*. Госиздат.

(Betti, 2009) Betti, R. (2009) L*a matematica come abitudine del pensiero - Le idee scientifiche di Pavel Florenskij*. Università Bocconi Centro PRISTEM, Milano.

(Borel, 1923) Борель Э. (1923) *Случай. Перевод с французского Ю.И. Костицыной под редакцией В.А.Костицына*. Современные проблемы естествознания, 8. Госиздат, Москва.-Петроград.

(Bowley, 1907) Bowley, A. (1907) Elements of Statistics. London, P. S. King & son.

(Bugaiev, 1898) Bugaiev, N. V. (1898) *Les mathématiques et la conception du monde du point de vue scientifique*. In Rudio, F., (Ed), *Verhandlungen des ersten internationalen Mathematiker-Congresses in Zürich (*p. 206–223). Teubner, Leipzig.

(Bustamante, Cléry and Mazliak, 2015) Bustamante M-C., Cléry M. et Mazliak L. (2015) Le Traité du calcul des probabilités et de ses applications: étendue et limites d'un projet borélien de grande envergure (1921-1939). *North-Western European Journal of Mathematics*, 1, 85-123.

(Castelnuovo, 1919) Castelnuovo, G. (1919) *Calcolo delle probabilità*. D. Alighieri, Milano.

(Czuber, 1914) Czuber, E. (1903) *Wahrscheinlichkeitsrechnung und ihre Anwendung auf Fehlerausgleichung, Statistik und Lebensversicherung*. Teubner, Leipzig.. Second edition 1910, third 1914.

(David-Fox, 1997) David-Fox, M. (1997) *Revolution of he Mind: Higher learning among the Bolsheviks, 1918-1929*. Cornell University Press, Ithaca.

(David-Fox, 1998) David-Fox, M. (1998) Symbiosis to Synthesis: the Communist Academy and the bolshevization of the Russian Academy of Sciences, 1918-1929. *Jarbücher für Geschichte Osteureopas*, 46, 219-243.

(Demidov and Lëvshin, 2016) Demidov, S.S. and Lëvshin B.V. (Roger Cooke, translator) (2016) *The Case of Academician Nikolai Nikolaevich Luzin*. American Mathematical Society.

(Demidov, Parshin and Polovinkin, 1989) Демидов С.С., Паршин А.Н., Половинкин С.М. (1989) О переписке Н.Н.Лузина с П.А.Флоренским. *Историко-математические исследования*. 31, 116-125.

(Douglas, 1966) Douglas, M. *Purity and Danger: An Analysis of Concepts of Pollution and Taboo*. Routledge and Keegan Paul.

(Dubnov and Rashevskij, 1949) Дубнов Я.С., Рашевский П.К. В.Ф. Каган. (1949) *Труды семинара по векторному и тензорному анализу*. 7, 16-30.

(Durand and Mazliak, 2011) Durand, A. and Mazliak, L. (2011). Revisiting the sources of Borel's interest in probability : Continued fractions, social involvement, Volterra's prolusione. *Centaurus*, 53 :306–332.

(Engels, 1959) Engels, F. (1859). *Anti-Dühring*. Foreign Languages Publishing House, Moscow.

(Ekelund and Hebert, 1999) Ekelund, R. B. Jr. and Hebert, R. F. (1999) *Secret Origins of Modern Microeconomics: Dupuit and the Engineers*, University of Chicago Press.

(Ford, 1991) Ford, C.E. (1991) Dmitrii Egorov: Mathematics and religion in Moscow. *Mathematical Intelligencer* 13, 24–30.

(Forman, 1971) Forman, P. (1971) Weimar Culture, Causality, and Quantum Theory, 1918-1927: Adaptation by German Physicists and Mathematicians to a Hostile Intellectual Environment. *Historical Studies in the Physical Sciences*, 3, 1-115.

(Gliko, 2011) Глико, А.О. (2011) *Отто Юльевич Шмидт в истории России XX века и развитие его научных идей*. Физматлит, Москва.

(Graham, 1987) Graham, L. R. (1987) *Science, Philosophy, and Human Behavior in the Soviet Union*, Columbia University Press.

(Graham and Kantor, 2009) Graham, L.R. and Kantor, J.-M. (2009) *Naming Infinity. A True Story of Religious Mysticism and Mathematical Creativity*. Harvard University Press.

(Guieu, 1998) Guieu, J.-M. (1998) L'engagement européen d'un grand mathématicien français : Émile Borel et la "coopération européenne", des années vingt aux années quarante, *Bulletin de l'Institut Pierre Renouvin*, 5.

(Hawkins, 1970) Hawkins, T. (1970). *Lebesgue's theory of integration. Its origins and development*. University of Wisconsin Press.

(Hungerford, 2008) Hungerford, T.W. (2008) *Algebra*. Graduate Texts in Mathematics, 73. Springer, New York.

(Hayek, 1944) Hayek, F.A.(1944) *The road to serfdom*. Routledge and University of Chicago Press.

(Hessen, 1929) Б.М.Гессен. (1929) Статистический метод в физике и новое обоснование теории вероятностей Р.Мизеса. *Естествознание и марксизм,* 1, 33-58.

(Jaurès, 1901) Jaurès, J. (1901) La philosophie de Vaillant. *La Petite république socialiste*, 8 janvier 1901.

(Joravsky, 1961). Joravsky, D. (1961) *Soviet Marxism and natural science 1917-1932*. Routledge and Kegan Paul.

(Kassof, 2004) Kassof, B. (2004) A book of Socialism. Stalinist culture and the first edition of the Bol'shaia sovetskaia entsiklopediia. *Kritika*, 6, 1, 55-95.

(Khinchin and Kolmogorov, 1925) Khinchin, A.Y., Kolmogorov, A.N. (1925) Über Konvergenz von Reihen, deren Glieder durch den Zufall bestimmt werden. *Matematicheskij Sbornik*, 32, 668–677.

(Korobkova, 2014) Коробкова С. Н. (2014) Журнал «Научное обозрение» и идейные поиски русской интеллигенции конца XIX – начала XX в. *Вестник Ленинградского государственного университета*, 3.4, 189-196.

(Krementsov, 1997) Krementsov, N. (1997) *Stalinist Science*. Princeton University Press.

(Kagan, 1910) Каган, В.Ф. (1910) Что такое алгебра? Mathesis, Одесса.

(Kagan, 1929) Каган, В.Ф. (1929) К десятилетию научного издательства. Научный работник 5-6, 28-34.

(Kazanin, 2007) Казанин И.Е. (2007) *Формирование руководством РСФСР-СССР партийно-государственной политики по отношению к интеллигенции в Октябре 1917-1925 г*. Диссертация (Отечественная история). Волгоград.

(Kolmogorov, 1931)Kolmogoroff A. (1931) Über die analytischen Methoden in der Wahrscheinlichkeitsrechnung. *Mathematische Annalen*, 104, 149-160.

(Kolmogorov, 1933) Kolmogoroff A. (1933) *Grundbegriffe der Wahrscheinlichkeitsrechnung*, Ergebnisse der Mathematik und ihrer Grenzgebiete, II 3, Springer, Berlin.

(Kolmogorov, 1967) A.N.Kolmogorov (1967) On the principle of excluded middle. In Jean van Heijenhoort (ed). *From Frege to Gödel*. (pp.414-437). Harvard University Press.

(Koriakin, 2011) Корякин, В. (2011) Отто Шмидт. Великие Исторические Персоны. Вече, Москва.

(Koselleck, 2002) Koselleck, R. (2002) *The practice of conceptual history: Timing History, Spacing concepts*. Stanford University Press.

(Kuznetsov, 2006) Кузнецов, И.В. (2006) *История отечественной журналистики (1917-2000)* Москва, Изд.а Флинта Наука.

(Khinchin, 1926) Хинчин, А.Я. (1926) Идеи интуиционизма и борьба за предмет в современной математике. *Вестник Коммунистической Академии* 16:184–192.

(Lakhtin, 1924) Лахтин, Л. К. (1924) *Курс теории вероятностей*. Специальные пособия для высшей школы. Госиздат, Москва-Петроград.

(Lenin, 1918) Lenin V. I. (1918) The Immediate Task of the Soviet Government. Article on April 28, 1918 in Pravda No. 83. In *Lenin's Collected Works*, 4th English Edition (1972), Volume 27, (pp.235-77), Progress Publishers, Moscow.

(Lenin, 1947) Materialism and Empirio-Criticism: Critical Comments on a Reactionary Philosophy, Foreign Languages Publishing House, Moscow. 1947.

(Lëvshin, 2002) Лёвшин Л. В. (2002) *Деканы физического факультета Московского университета*. — М.: Физический факультет МГУ. (Леонид Кузьмич Лахтин. pp.158-163).

(Lévy, 1925) Lévy, Paul. *Calcul des Probabilités*. Gauthier-Villars.

(Lopshitz and Rashevskij, 1969) Лопшиц А.М. Рашевский П.К. *Вениамин Федорович Каган (1869–1953)*. Замечательные ученые Московского университета, 39. Издательство Московского Университета.

(Loren, 1996) G.Loren. *The ghost of the executed engineer*. Harvard University Press, 1996

(Maksimov, 1931) Максимов, А.А. (1931) О положении на фронте естествознания. *За марксистско ленинское естествознание*, 1, 1-7.

(Markov, 1924) Марков, А. А. (1924) *Исчисление вероятностей*. - 4-е посмертное изд., перераб. автором / биогр. очерк А.С. Безиковича. Госиздат, Москва.

(Mazliak and Sage, 2014) Mazliak, L. and Sage, M. (2014) Au-delà des réels : Émile Borel et l'approche probabiliste de la réalité. *Revue d'histoire des sciences*, 67(2), 331–357.

(Mazliak and Perfettini, 2017) Mazliak, L. et Perfettini, T. (2017) Réflexions sur le hasard dans la société soviétique en construction. Deux textes tirés du débat des années 1920.To appear in *Revue de Synthèse*.

(Mespoulet, 2001) Mespoulet, M. (2001) *Statistique et révolution en Russie. Un compromis impossible (1880-1930)*. Rennes, Presses Universitaires de Rennes.

(Ossorgin, 1955) Осоргин М. А. (1955) *Времена*. Alon, Paris.

(Orlov, 1923) Orlov, I.E.(1923) Recension of Borel's book "Случай". *Under the banner of Marxism*, 10, 260-264.

(Orlov, 1925) Орлов, И. Е. (1925) *Логика естествознания*. Госиздат, Москва.

(Pechenkin, 2010) Pechenkin, A. (2010) *Leonid Isaakovich Mandelstam: Research,*

Teaching, Life. Springer.

(Petrov, 1960) Петров, Ф.Н. (1960) Первые советские энциклопедии. *Книга исследования и материалы*. 3, 132-138.

(Poincaré, 1912) Poincaré, H. (1912) *Calcul des Probabilités* (2ème édition). Gauthier-Villars

(Ruud, 1990) Ruud, C. (1990) *Russian Entrepreneur: Publisher Ivan Sytin of Moscow, 1851-1934*. McGill-Queen's University Press.

(Rikun, 2012) Рикун, И. Э.(2012) «МАТЕЗИС»—лучшее российское научно-просветительское издательство первой четверти xx века. *Математика в высшем образовании* 10, 141-147.

(Rybkin, 1972) Rybkin, G.F. (1972) An obituary. *Uspekhi Matematicheskikh nauk*, 27, 223-225.

(Seneta, 2003) Seneta, E. (2003) Statistical Regularity and Free Will: L.A.J. Quetelet and P.A. Nekrasov. *International Statistical Review*. 71, 2, 319-334.

(Seneta, 2004) Seneta, E. (2004) Mathematics, religion and Marxism in the Soviet Union, *Historia Mathematica*, 31, 337-367.

(Siegmund-Schultze, 2004) Siegmund-Schultze, R. (2004) Mathematicians Forced to Philosophize: An Introduction to Khinchin's Paper on von Mises' Theory of Probability. *Science in Context* 17(3), 373–390.

(Smit-Falkner, 1927) Смит-Фалкнер М. (1927) Учёт, статистика и плановость. *Вестник статистики*, 4, 15-30.

(Shmidt, 2015) Шмидт, О. Ю. (2015) *Абстрактная теория групп*. Физико-математическое наследие: математика (история математики). Ленанд, Москва.

(Shmidt, 1922) Шмидт, О. Ю. (1922) *Госиздат за 5 лет*. Госиздат, Москва.

(Svetlikova, 2013) Svetlikova, I. (2013) *The Moscow Pythagoreans*. Palgrave-MacMillan.

(Tagliagambe, 2003) Tagliagambe S. (2003) Mathematics and Culture in Russia, in Emmer, M (Ed.), *Mathematics and Culture* (pp.67-94) Springer-Verlag, New-York.

(Verburgt, 2106) Verburgt, L.M. and Hoppe-Kondrikova, O. (2016) On A.Ya. Khinchin's paper 'Ideas of intuitionism and the struggle for a subject matter in contemporary mathematics' (1926): A translation with introduction and commentary. *Historia Mathematica* 43, 369–398.

(Vucinich, 1999) Vucinich, A. (1999) Mathematics and Dialectics in the Soviet Union: The Pre-Stalin Period. Historia Mathematica 26, 107-124.

(Vucinich, 2000) Vucinich, A. (2000) Soviet mathematics and dialectics in the Stalin era.

Historia Mathematica 27, 54–76.

(Yanovskaya, 1931) Яновская, София А. (1931) Математика в БСЭ. In *На борьбу за материалистическую диалектику в математике* (pp.305-315). Гос.Научно Техническое Издательство.