
История логики
History of logic

IRVING H. ANELLIS, VALENTIN A. BAZHANOV

**Image of Soviet and Russian logic in the West.
Latter half of the XXth century**

Irving H. Anellis

Iowa State University,
Ames, IA 50011, USA.
Indiana University-Purdue University at Indianapolis,
Indianapolis, IN 46202, USA.
E-mail: -

Valentin A. Bazhanov

Interregional Non-Governmental Organization “Russian Society for History and Philosophy of Science”,
1/36 Lyalin lane, bd. 2, Moscow, 105062, Russian Federation.
E-mail: vbazhanov@yandex.ru

Abstract: The article attempts to overview Western scientific knowledge of research in mathematical logic and its history in the USSR and Russia in the second half of the 20th century. We claim that Western scholars followed and were generally aware of the main works of their Soviet and Russian colleagues on mathematical logic and its history. It was possible, firstly, due to the fact that a number of Western scientists knew the Russian language, and, secondly, because Soviet and Russian logicians published their works in English (sometimes in German) in the original journals of mathematical logic or Soviet publishing houses (mainly Mir Publishers) translated Soviet authors into English. Thus, the names of A.G. Dragalin, Yu.L. Ershov, A.S. Karpenko, A.N. Kolmogorov, Z.A. Kuzicheva, Yu.I. Manin, S.Yu. Maslov, F.A. Medvedev, G.E. Mints, V.N. Salii, V.A. Smirnov, A.A. Stolyar, N.I. Styazhkin, V.A. Uspensky, I.M. Yaglom, S.A. Yanovskaya, A.P. Yushkevich, A.A. Zinov’ev were quite known to their Western counterparts. With the dawn of perestroika, contacts of Soviet / Russian logicians expanded significantly. Nevertheless, the analysis of Western works on mathematical logic and the history of logic suggests that by the end of the 20th century the interest of Western scientists in the works of their Russian colleagues had noticeably waned.

Keywords: the history of logic in Russia and the USSR, mathematical logic, traditional logic, non-classical logic, bibliography

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1. Introduction

From the nineteenth century forward, Russian and Soviet logicians have been an integral and important part of the international logic community. Nevertheless, much of their work is known only second-hand, if at all, either because the work is sometimes inaccessible or because so much of it was written in Russian. More often than not, little is known about the work of Russian/Soviet logicians. As an example, one can refer to M.J. Beeson's mere half-page discussion of A.A. Markov and his school of constructivist mathematics within the twenty-two page "Historical Appendix" of his *Foundations of Constructive Mathematics* [Beeson, 1985, p. 434]. But even when western-language versions of Russian work is available, that work is not always given due consideration. Thus, for example, B. Kushner [Kushner, 1994, pp. 183–184] has pointedly noted that although "the language barrier is often mentioned" in this regard, it does not always explain the reason for the neglect. He mentions that it would have been no easier, for example, for Kolmogorov to read English than it would be for his English-speaking colleagues to read Russian. Moreover, even work that appeared in Germany, such as Kolmogorov's [Kolmogorov, 1932] "Zur Deutung der intuitionistischen Logik" and Novikov's [Novikov, 1943] "On the Consistency of Certain Logical Calculus" were, Kushner avers, neglected, and is "practically unknown outside the former USSR." Similarly, W. Weidlé [Weidlé, 1961, pp. 60–61], in another context, namely nineteenth-century Russian literature, offered three possible reasons why "Europe" "has not fully assimilated" the work of the great Russian writers: a lack of translations; ignorance of the Russian language; or the indolence of readers. There is little excuse in the case of Kolmogorov's paper for blaming inaccessibility, since the paper appeared in Germany and in a German, not a Russian, journal — and a well-known German mathematics journal at that. Kushner does not explicitly say so, but he leaves nonetheless the impression that there may be some other explanation. One might re-tort that every mathematician in the world knows the names and work of N. Lobachevskii, of M. Ostrogradskii, of P. Chebyshev, so that the neglect that Kushner detects of the work of Kolmogorov and Novikov does not reflect any particular bias. But one can no more legitimately speak about the history of mathematics in Russia by citing only Lobachevskii, Ostrogradskii, and Chebyshev than about the history of mathematics by citing only Euclid, Fermat, and Gauss.

In writing about the "paucity" of American scholarship on the history of the Russian Orthodox church, the bibliographer and historian E. Kasinec suggested a less sinister explanation than the one that Kushner has seemingly hinted at in regard to the lack of American or western European scholarship on the history of mathematics or logic in Russia. Kasinec proposed that this dearth of

attention which he detected was owing to “lack of familiarity with this subject’s vast published and unpublished sources” [Kasinec, 1978, p. 202].

To the present day, there exist no comprehensive, systematic, up-to-date surveys of Russian/Soviet contributions to the field of logic, even in Russian language. Nor for that matter, are there any such broad surveys of the history of logic in Russia generally in Western languages. We are setting the goal to fill up this gap. We planned with Dr. I. Anellis some articles on the history of logic in Russia and the USSR. However, the decease of Dr. Anellis interrupted and postponed this work. Present paper is the first part of this plan.

2. Surveys

Ch. Thiel announced a plan to produce a study of mathematical logic in Russia, but this work was not accomplished [Thiel, 1991]. A. Walicki’s *A History of Russian Thought* specifically notes that history of logic in Russia falls outside of its scope, as does philosophy of science [Walicki, 1979, XV]. The monumentally long, comprehensive survey papers by S.A. Yanovskaya (1896–1966), “*Foundations of Mathematics and Mathematical Logic*” [Yanovskaya, 1948] and “*Mathematical Logic and Foundations of Mathematics*” [Yanovskaya, 1959] are now long out of date. Yanovskaya’s surveys have been followed by the collection of articles published by P.I. Nikitin [Nikitin, 1962] under the title *Outline of the History of Logic in Russia* and by the books of N.I. Styazhkin and V.D. Silakov [Styazhkin, Silakov, 1962], *Short Sketch of the History of General and Mathematical Logic in Russia and of Styazhkin* [Ibid.], *Outline of the History of Logic in Russia*, which concentrate their attention on the nineteenth century. In 1955 A.P. Primakovskii published a fifty-six page bibliography of Russian-language logic studies for the period of the XVIII to XX centuries¹ [Primakovskii, 1955], which, regrettably, had been denounced by professional bibliographers [Zozulya, Fomin, 1955] as badly organized and plagued by numerous errors. Later, Soviet historians of mathematics have written only very short surveys on logic, as part of larger general histories of mathematics in Russia and the Soviet Union; among these are A.P. [Yushkevich, 1968] *History of Mathematics in Russia to the Year 1917*, which devotes seven pages to logic, A.N. Kolmogorov and A.P. Yushkevich’s [Kolmogorov, Yushkevich, 1978, pp. 531–537] *Mathematics in the Nineteenth Century*, the first chapter of which, by Z.A. Kuzicheva [Kuzicheva, 1978], on mathematical logic, gives some attention to Russian logicians such as P.S. Poretskii (1846–1907), and Y.L. Ershov’s [Ershov, 1983] “*Mathematical Logic and Foundations of Mathematics*”, one of the more recent Soviet surveys, which attempts to cover Soviet

¹Another bibliography of Russian/Soviet logical studies was published in 2001 [Antonova et al., 2001], but this work is far from being perfect as well.

contributions to mathematical logic by devoting an average of less than one page per decade. Kuzicheva's essay is also available in English translation² [Kuzicheva, 1992]. First intellectual biography of N.A. Vasiliev attracted close attention by Western scholars [Bazhanov, 1988]. V.L. Vasyukov translated major Vasiliev's work "Logic and Metalogic" into English [Vasilev, 1993].

In Western languages, one finds very much less; An Annotated Bibliography of Western-Language (mainly English) Sources for the History of Formal Logic in Russia compiled by H. Kormin and I.H. Anellis [Kormin, Anellis, 2000] lists just over 330 titles, of which many are merely brief notices in abstracting or review journals. [Küng, 1962] "Bibliography of Soviet Work in the Field of Mathematical Logic and the Foundations of Mathematics is vastly out of date, focuses considerable attention on philosophical rather than technical writings, and is heavily based upon Yanovskaya's (1948) and (1959) surveys. Another bibliography was published by [Hänggi, 1971], and is also therefore seriously outdated. In addition, there are a handful of very brief survey articles, most prominent among them [Bochenski, 1961] "Soviet Logic", [Cavaliere, 1988] "Il dibattito sulla logica in Unione Sovietica (1945–1965)", [Comey, 1966] "Current Trends in Soviet Logic" [Hänggi, 1967] "Die Entwicklung der Diskussion um die formale Logik in der Sowjetunion" [Küng, 1961] "Mathematical Logic in the Soviet Union (1917–1947 and 1947–1957)", A. Winkelmann's "Die Stellung der formalen Logik im Sowjetunion" [Winkelmann, 1956] and "Formal Logic in Soviet Philosophy" [Winkelmann, 1957], and A.A. Zinov'ev's "Logic in the USSR" [Zinov'ev, 1968] with his books published in English [Zinov'ev, 1963; Zinov'ev, 1973; Zinov'ev, 1983]. Brief summaries of Yanovskaya's two surveys are also available, by [Kline, 1951] and [Cogan, 1962] respectively. A small number of more specialized surveys have also been undertaken, among them [Cavaliere, 1985] report on the Soviet discussions about the extension of mathematical logic to non-classical logics and her full-scale survey, *La logica formale in Unione* [Cavaliere, 1990], of the philosophical/ ideological debates during the crucial period 1946–1965 between formal logicians and dialecticians on the role and status of formal logic and its impact on Soviet work in formal logic, L.H. Hackstaff and J.M. Bochenski's [Hackstaff, Bochenski, 1962] study of A.A. Zinov'ev's work in many-valued logics, D. Comey's [Comey, 1962] discussion of two Soviet conferences on logic (one, which met in 1958 and was largely concerned with the status of logic within the Soviet educational system and curriculum, another which met in 1960, which largely consisted of talks on philo-

²There are also detailed biographies of important figures in the history of modern logic published later, for example [Bazhanov, 2001a; Bazhanov, 2001b; Bazhanov, 2007; Bazhanov, 2013; Bazhanov, 2016; Bazhanov, 2017], as well as [Biryukov, 2001; Karpenko, 2013], personal and intellectual biography of N.A. Vasiliev [Bazhanov, 2009; Schumann, 2013].

sophical, methodological, and foundational issues of logic), the S.Y. Maslov, G.E. Mints and [Maslov et al., 1971] survey on “Mechanical Proof Search and the Theory of Logical Deduction in the USSR”, and émigré V. Lifschitz’s survey on *Mechanical Theorem Proving in the USSR (The Leningrad School)* [Lifschitz, 1986], an informally prepared and published typescript, Anellis’s very brief account [Anellis, 1988] of Maslov’s inverse method for establishing the decidability of certain calculi, and Mints’s surveys on “Proof Theory in the USSR 1925–1969” [Mints, 1991] and “Proof Theory in the USSR 1925–69” [Mints, 1989] on which the former article is based. Lifschitz’s publication belongs to a series established by emigré Soviet scientists who describe the work of their former Soviet colleagues in their own areas of expertise. Some special attention has also been given, especially by [Bochenski, 1967; Bochenski, 1973] and [Anellis, 1987; Anellis, 1987a; Anellis, 1996] to the work of S.A. Yanovskaya in logic and history of mathematics and to her critical role in establishing a chair of mathematical logic at Moscow State University. Bazhanov has written a large number of articles in English on various aspects of Vasiliev and his work since 1985, as well as more general articles on the history of non-classical logics, especially of paraconsistent logics, including articles on Vasiliev published in English in *Studies in Soviet Thought* [Bazhanov, 1990] and *Modern Logic* [Bazhanov, 1992; Bazhanov, 1994]. Similarly, Kuzicheva has published a sketch, in Russian, of the life and work of historian of logic N.I. Styazhkin (1932–1986) [Kuzicheva, 1991], along with a bibliography of his scientific writings [Kuzicheva, 1991a]. S.A. Yanovskaya has also recently been written about in English by some of her former students, in particular by [Kushner, 1996], who has also written in English about [Kushner, 1993], A.N. Kolmogorov and V.A. Uspenskii [Kushner, 1994]. Some information related to the state of logical studies in the USSR/Russia may be found in the book “Logic in Central and Eastern Europe” [Schumann, 2013].

All of these surveys are rather brief, and so by their very nature are unable to give a thorough or timely picture of the impressive and significant contributions to mathematical logic by Russian/Soviet researchers. The survey book *Recent Soviet Contributions to Mathematics* by J.P. LaSalle and S. Lefschetz [LaSalle, Lefschetz, 1962] is already very old, and in any case does not consider the field of mathematical logic at all; moreover, it is barely more than an annotated bibliography of those areas which it does cover.

3. Western-language translations of Russian-language works in logic

Not only is there a small number of surveys of Russian and Soviet work in logic, but there is also a rather small number of Western-language translations of Russian-language work in this area, compared to what would be desirable, and especially in comparison to the number of translations from other languages into Russian — although admittedly the number of translations of Russian studies is now beginning to grow. Thus, the American Association for the Advancement of Science reported in 1984 that, despite translation programs that are under way, Soviet contributions to the field of mathematics generally are neither well known to, nor sufficiently represented in the literature of, American colleagues of Soviet researchers (see [Holden, 1984]), while the American Mathematical Society (AMS) has expressed concern that, in response to its own translation program, however limited that program is, there are fewer numbers of mathematicians in the U.S., Britain, Canada or Australia who are able to read Russian, and that it has frequently searched long and hard for mathematicians who could serve as Russian translators for its programs.

For much of the time, Russian and Soviet work in logic has been greatly undervalued, despite the crucial role which it might have, and on occasion has had, because of its frequent inaccessibility. In the period before World War II, many Russian logicians and their Soviet successors wrote in French or German rather than in Russian, and this helped to some extent, but did not always solve the problem (since, as often as not, even many of those papers written in French or German appeared in Russian journals which were not well known in the West). Moreover, the greater amount of published scientific research in Russia / the USSR continues to be written in Russian. A joint Association for Symbolic Logic / American Mathematical Society Russian translations program has done much to alleviate this situation, but again only in comparatively small measure.

The AMS has an active program of translation into English of Russian texts in all branches of mathematics (including mathematical logic); this program is administered by Ben Silver at the AMS offices in Providence, Rhode Island. The AMS translations of the Proceedings of the Steklov Institute of Mathematics include many volumes devoted exclusively to logic, and the AMS actively cooperates in the dissemination of translation volumes of nearly all major Soviet mathematics journals, including those published by the Plenum Publishing Corporation. At the same time, the London Mathematical Society publishes an English translation of *Uspekhi Matematicheskoi Nauk*, under the title *Russian Mathematical Surveys*, and began, with volume 33 in 1978, to include in their translation the “Short Communication” which appear in

Uspekhi. In addition, the AMS has its own continuing series, “AMS Translations”, already in its second series of well over one hundred volumes, which consist of anthologies of translations of important Russian-language research papers in all fields, including logic. One of the more recent publications in the “AMS Translations” series appeared, under the title *Six Papers in Logic*, edited by Ben Silver [Silver, 1987]; this book includes articles of S.N. Artemov, M.I. Bekenov, A.D. Korshunov, V.E. Vail’, and B.I. Zil’ber. Off the press in 1988 was the book *Mathematical Intuitionism: Introduction to Proof Theory* by A.G. Dragalin [Dragalin, 1988], who for many years was an important figure in logic and mathematics in the USSR. Among the other works in the AMS translation series which have some interest for logicians working in algebraic logic and related area are such books as V.N. Salii’s [Salii, 1988] *Lattices with Unique Complements*.

Academic presses also on occasion publish translations of Russian-language logic books. Most prominent of these are MIT Press, which published N.I. [Styazhkin, 1969] *History of Mathematical Logic from Leibniz to Peano* and A.A. Stolyar’s [Stolyar, 1970] textbook *Introduction to Elementary Mathematical Logic*, the latter having been published on the advice of J. van Heijenoort [Kolmogorov, 1967], who refereed it for MIT Press. Stolyar’s book has been reprinted by Dover Publications [Stolyar, 1983], while the Springer, which specializes in high-quality mathematical monographs, has published Y. Manin’s [Manin, 1977] *A Course in Mathematical Logic*, Berlin’s VEB Deutscher-Verlag published P.S. Novikov’s classic and historically significant textbook, *Grundzüge der mathematischen Logik* [Novikov, 1973], while Addison-Wesley published that same work as *Elements of Mathematical Logic* [Novikov, 1964], and North-Holland Publishing, which likewise specializes in highquality, but costly, mathematical monographs, has published A.I. Mal’tsev’s *The Metamathematics of Algebraic Systems* [Mal’tsev, 1971]. Styazhkin’s history of mathematical logic has also been made available in Italian translation [Styazhkin, 1980]. Some books by Russian logicians were published in English directly in English [Chagrov, Zakharyashev, 1997].

In early 1989, Anellis began assembling an editorial board for *Modern Logic*, a new journal of the history of modern logic; included on the board was A.G. Barabashev and V.A. Bazhanov. *Modern Logic* had made an effort to bring the work of Russian and Soviet logicians to the attention of the international community, and published expository surveys and historical studies of Russian and Soviet research, both in Russian and in western European languages. These examples may, of course, be multiplied. Mir Publishers of Moscow also had its own translation series, the “Little Mathematics Library”, which makes available English translations of texts which, with a few exceptions, are

mainly of a rather elementary level. Among these, three which are of particular interest to logicians are V.A. Uspenskii's Post's Machine [Uspenskii, 1983] and Gödel's Incompleteness Theorem [Uspenskii, 1987], and I.M. Yaglom's An Unusual Algebra on Boolean algebra [Yaglom, 1978]. Many of the booklets in this series were based upon lectures either to young children or to secondary school students. A notable exception is Uspenskii's [Uspenskii, 1974] work on Gödel's incompleteness theorem, which is based upon an article of the author's which originally appeared in *Uspekhi* and which presents a solid technical exposition of Gödel's result and the details of its proof from a Markovian, or algorithmic, point of view. All of these translations appeared within a fairly short time of their original publication. The Soviet publisher Mir has also published Y.L. Ershov and E.A. Palyutin's text *Mathematical Logic* [Ershov, Palyutin, 1984], and this translation, as a matter of fact, is technically superior to the Russian original, since mathematical errors which appeared in the original have been corrected in the translation, although the translation itself is clumsy at best (see the reviews of the original by Mints [Mints, 1986b] and of the translation by E. Mendelson [Mendelson, 1986a]). Moscow's Progress Publishers have provided English translations of A.D. Getmanova's undergraduate-level introductory textbook *Logic* [Getmanova, 1989] and A.D. Getmanova, M.I. Panov, and V.V. Petrov's elementary-level logic dictionary *Logic Made Simple* [Getmanova et al., 1990].

One of the most active organizations for the dissemination of Russian/Soviet research in logic is the US-based international Association for Symbolic Logic and its official organ, the *Journal of Symbolic Logic*. From its first volume, which appeared in 1936, the *Journal of Symbolic Logic* has provided reviews of many major Soviet publications in logic; this includes work in classical and mathematical logic, history and philosophy of mathematics and logic, and computer science and algorithmic logic, as well, occasionally, as work in applications of logic to other areas of mathematics such as number theory and algebra, including, for example, group theory and associative algebras. The AMS/ASL Translations Committee, formed in 1982, originally included S. Feferman, an American whose specialty is proof theory, J.P. Jones, a Canadian whose specialty is recursion theory and its applications, Soviet emigré to the US V. Lifschitz, specializing in constructive logic and currently working in algorithmic logic and development of mechanical proof procedures for computers, and G.E. Mints. Feferman was replaced on the committee in 1984 by the American G. Cherlin. In 1988 and 1989, the committee consisted of E. Mendelson, the coordinator, whose term expired at the end of 1989, B.F. Wells, whose term also expires at the end of 1989, and G.E. Mints and V. Lifschitz, both of whose terms expired at the end of 1990.

These institutional translation efforts were preceded by individual efforts; perhaps the best known is J. van Heijenoort's translation of A.N. Kolmogorov's pioneering paper of 1925 in constructive logic, "O principe tertium non datur" ("On the principle of excluded middle" [Kolmogorov, 1925]), published by van Heijenoort [Kolmogorov, 1967], with the permission of Kolmogorov, along with an expository introduction by Hao Wang, in van Heijenoort groundbreaking anthology, *From Frege to Gödel* [Ibid.].

Also of special interest to logicians among the translations available is *Algebra and Logic*. This represents a unique situation. *Algebra and Logic* was published as a journal by Plenum.

The intense translation programs from English into Russian and the rather less active translation programs from Russian into English give strong indications of the interdependence of Soviet work and Western work in logic. Nowhere, perhaps, is this thorough interdependence better evidenced than by the translation into Russian of N. Cutland's textbook *Computability: An Introduction to Recursive Function Theory* [Cutland, 1983], just within three years of its initial publication. For, in the "Bibliography" of the original English edition, Cutland includes an English translation from the Russian of Y.I. Manin's logic textbook *A Course in Mathematical Logic* [Manin, 1977].

4. Attempts to reach an international audience

In addition to translations of their work into Western languages, we find Soviet logicians were attempting to reach an international audience by publication of some of their original research papers in Western languages. The appearance of F.A. Medvedev's [Medvedev, 1982] German-language paper on Jules König is but one example of the latter. Publication in western languages revives a tradition that, as we noted, was once very strong. Prior to the Russian Revolution of 1917, and indeed up until the beginning of World War II, it was not in the least uncommon for Russian scientists to publish their research, even works appearing in Russian journals, in Western European languages, most notably in French and German. This tradition never died out completely, as evidenced by the republication, as "Theorie der Numerierungen" [Ershov, 1973–1977], of Y.L. Ershov's three-volume book *The Theory of Enumerations* [Ershov, 1977]. It was also common for Russian and Soviet scholars prior to World War II to carry out at least some of their studies at Western European universities. This tradition can be traced back to the early seventeenth century, when some Russians travelled to England, and especially to Cambridge, to study the mathematical and scientific work of John Dee, while others travelled to Spain to study the logic and philosophy of Raymond Lully. This tradition of travel abroad for study was especially notable in the late seventeenth and early eighteenth centur-

ies; the most famous of these examples is that of M.V. Lomonosov (1711–1756), who in 1736 travelled to Marburg, where he studied mathematics and logic (among other subjects) with Christian Wolff. We will also note, in our examination of the development of mathematical logic in the early Soviet period, the active presence of Soviet mathematicians, particularly at Göttingen, under the influence of Emmy Noether; among these were A.G. Kurosh (1908–1971), P.S. Aleksandrov (1896–1982) and P.S. Urysohn (1898–1924), the latter two, together with N.N. Luzin (1883–1950), also actively carrying out research in France with mathematicians such as Maurice René Fréchet. The most notable example of this trend during the early Soviet period, however, must be M.I. Sheinfinkel' (Moses Schönfinkel; 1889–1942), founder of combinatory logic, a student of S.O. (or often (I)osifovich) Shatunovskii (1859–1929) in Odessa, who later carried out most of his work at Göttingen, under the influence of Hilbert, and who died in Moscow in 1942. More recently, we have the very similar example of the Ukrainian algebraic logician and specialist in universal algebra, L.A. Kaluzhnin, who received his mathematical training in Berlin, Hamburg, and Paris during the post-war period, before becoming Professor in the Chair of Algebra and Logic at the Kiev State University in 1955.

These formal and institutional contacts were further enhanced by a strong network of informal and personal contacts that have resulted in joint publications by Soviet and Western logicians, as well as in joint collaboration on special projects. Some of these collaborative efforts will be considered in the course of our survey. Thus, for example, while G.E. Mints was still in Leningrad, he participated with I.H. Anellis in the organization of the American Mathematical Society Special Session on Proof Theory, 5–9 January 1982. This kind of collaboration was particularly active also in the interbellum period, circa 1920–1939, and included close cooperation between the internationally dominant Soviet, French, and Polish schools of set theory in the 1920s and 1930s. It was renewed after the mid-1950s when the immediate post-war period drew to a close, evidenced in the 1950s by the Boone-Novikov theorem on the unsolvability of the word problem for groups, and, much more recently, by joint work of American and Canadian logicians such as the late Julia Robinson (1919–1985), James P. Jones, and Martin Davis with Y. Matiyasevich of LOMI, extending Matiyasevich's initial results of the negative solution to Hilbert's tenth problem on the solvability of the word problem for diophantine equations.

This collaboration has been carried out in the context of international exchange programs as well as by participation at international conferences. These events partly removed iron curtain for Soviet scholars for a while. These included, by way of examples not meant to be exhaustive, the visit to Canada in 1981–1982 of Y.V. Matiyasevich, who was then the director of LOMI and

a leading recursion theorist, as well as the visit the following year of James P. Jones to LOMI, the inclusion of Y.L. Ershov, the premier Soviet recursion theorist, senior academician at the Siberian Branch of the Steklov Mathematics Institute at Novosibirsk, and developer of numeration theory, as invited speaker at Logic Colloquium '85, the European Summer Meeting of the Association for Symbolic Logic, at Paris, 7–13 July 1985, and the participation of Soviet logicians in Heyting '88, the Summer School and Conference on Mathematical Logic Honourably Dedicated to the 90-th Anniversary of Arend Heyting, at Chaika, Bulgaria, 13–23 September 1988; this included noted Soviet logicians such as M.I. Kanovich, B.A. Kushner, L.L. Maksimova, G.E. Mints, A.A. Muchnik, and I.D. Zaslavskii among the invited speakers, and Kanovich, Maksimova, Mints, and Muchnik, and Soviet emigrés V. Lifschitz (US) and B.A. Trakhtenbrot (Israel), as members of the program committee. (Since that time, both Mints and Kushner emigrated to the US.) In addition, several international logic conferences have recently been held in the USSR, including COLOG-88, a conference on computer logic held at Tallinn, Estonian SSR on 12–16 December 1988 (which included Ershov, S. Lavrov, Mints, and D.A. Pospelov on the Program committee and Ershov, Lifschitz, Mints, A.L. Semenov and M.A. Taitslin among the invited speakers, as well as such internationally recognized logicians as J.-Y. Girard and J.C. Shepherdson on the program committee and included among the invited speakers), and Logic at Botik '89: Seminar on the Logical Foundations of Computer Science, held at Pereslavl-Zalesskii in July 1989, which received wide attention through the American Mathematical Society. Nor must we forget to mention regular International congresses of Logic, Methodology and Philosophy of Science that provided the opportunity for Soviet logician to present their works directly to Western colleagues. For instance the volume of Sixth congress included the works by N.N. Nepeivoda “Logical Approach to Program-ming”, Y. Gurevich “Crumbly Spaces”, E.A. Palyutin “Number of Models in Complete Varieties”, E.K. Voishvillo “Semantic of generalized State Descriptions”, V.N. Kostyuk “Possible Worlds and the Ontology of a Scientific Theory”. Some Soviet logicians have had poor English, but their works were translated by native speakers. Very successful Eighth International Congress of Logic, Methodology and Philosophy of Science took place on 17–22 August 1987 in Moscow, on the campus of Moscow State University and which attracted 1500 scientists from throughout the world.

V.A. Smirnov (1931–1996) and his logical school at the Institute of Philosophy of the Academy of Sciences in Moscow did his best to ensure close collaboration of Soviet/Russian scholars with Western counterparts. He was among organizers of regular Soviet-Polish and Soviet-Finnish Conferences on Logic and Methodology of Science [Smirnov, 1979]. Some of his works were published

in leading European logical journals [Smirnov, 1971; Smirnov, 1973; Smirnov, 1982; Smirnov, 1983; Smirnov, 1986a; Smirnov, 1986b; Smirnov, 1987]. His spouse was logician as well [Smirnova, 1997; Smirnova, 1998; Smirnova, 2000a; Smirnova, 2000b; Smirnova, 2001]. Smirnov's left numerous pupils and may be considered as major figures in Soviet/Russian school of philosophical logic thought. Some of Ph.D. students Smirnov's introduced to the Western logical community [Gerasimova, 1996; Karpenko, 1996; Popov, 1996; Vasyukov, 1988; Vasyukov, 1993; Vasyukov, 1994]. After Smirnov's has gone, memorial notes were published [Bazhanov, 1996; Vasyukov, 1996; Finn, 2000] as well as his complete bibliography [Modern Logic, 1997]. Since 1997 Smirnov's readings took place in Moscow on regular base.

5. Conclusion

All of these considerations, taken together, should give a representative indication of the international significance of Russian and Soviet work in logic and of the integration of Russian and Soviet work into the whole network of developments of mathematical logic. It is also clear that a survey of the history of mathematical logic in Russia and the Soviet Union in a Western language is long overdue, and in general that a new systematic and comprehensive history in the tradition of Yanovskaya is warranted at this time.

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