Aleksander Aleksandrovich CHUPROV (or TSCHUPROW)
b. 5 February 1874 (o.s.) - d. 19 April 1926

Summary The correspondence between Chuprov and Markov marks the coming together of statistics and probability into mathematical statistics in the Russian Empire. As an émigré after the Revolution in Russia, Chuprov worked on statistical dependence, and discovered optimal allocation of a sample between strata.

Chuprov was born in Mosal'sk, Russia, and died an émigré in Geneva, having fallen ill in autumn of 1925 during the Rome session of the International Statistical Institute, to which he had been elected in 1911.

His father (A.I.) Aleksander Ivanovich Chuprov (1842-1908), with whom our Chuprov (A.A.) is often confused, particularly when the patronymic middle initial is omitted in their writings, was for many years a professor of political economy and statistics at Moscow University. A.I. was the ideological driving force behind *zemstvo* (an institution of local government) statistics, wherefrom the practice of sample surveys in the Russian Empire originated. He heavily influenced his son's formative years. A.A. initially (1892-1896) studied in the Physico-Mathematical Faculty of Moscow University which he completed with a dissertation on probability theory as a basis for theoretical statistics under the partial supervision of P.A. Nekrasov (1853-1924), who was a direct cause of A.A.'s later association with Markov (q.v.). Chuprov then travelled to Germany to study political economy. The years 1897-1901 were spent at Strasbourg University where his teachers were L. Bortkiewicz (q.v.) with whom he established a lasting friendship, and G.F. Knapp who supervised his doctoral dissertation *Die Feldgemeinschaft, eine morphologische Untersuchung* published in 1902. After his return to Russia in 1901, specifically to Moscow, A.A. was offered a position in 1902 in the newly formed Economics Section of the St. Petersburg Polytechnic Institute, where he was in charge of the organization and teaching of statistics till mid-1917. In 1909 his *Ocherki po Teorii Statistiki (Topics in the Theory of Statistics)* for which he was awarded a doctorate by Moscow University, was published and ran into a second edition within a year. It had great influence for a time in Russia because of its stress on the logical and mathematical approach to statistics, and because it contains an account of the then fast-developing stability theory of statistical series of trials (dispersion theory) of W. Lexis (q.v.) and Bortkiewicz. A postcard in response to its appearance from Markov

brought Chuprov into awareness of Markov's work. The subsequent prolonged correspondence between them resulted into a focussing of Chuprov's researches into a theoretical direction, and indeed marks the coming together in the Russian Empire of probability and statistics into mathematical statistics. During the St. Petersburg period he produced a number of notable disciples, including O.N. Anderson (1887-1960) later to become eminent in Bulgaria and Germany, N.S. Chetverikov (or Tschetwerikoff) (1885-1973), B.I. Karpenko (1892-1976); and S.S. Kon (or Kohn) (1888-1933).

Chuprov left Russia in June, 1917 (at the time of the Provisonal Government of Kerensky), to use, during the summer break, the materials of the Statistical Bureau in Stockholm to pursue his demographic studies on fertility and mortality as affected by the Great War; and on sample surveys. He had written on both topics during his St. Petersburg period. Proposed as Corresponding Member to the then Russian Academy of Science in his absence by P.B. Struvè (1870-1944), on 29 November, 1917, he was confirmed on the 2nd of December. Chuprov had meant to return to Petrograd (as St. Petersburg had been renamed) in September, 1917, but fell ill. In April 1918 the Soviet authorities invited him to take up the headship of the Central Statistical Office, but in fact he was never to return, possibly through lack of funds, possibly through unwillingness to face the post-revolutionary turbulence.

In the years 1917-1919 he published in Stockholm a bulletin on world economy sponsored by Russian émigré cooperative centres. This kind of publicistic work was the continuation of Chuprov's activity in St. Petersburg where he worked with V.A. Rosenberg and wrote on the need for agricultural reform and demographic questions, for the newspaper *Russkie Vedomosti (Russian News)* upto the time the newspaper was closed down by the Soviets. Its last number bears the note: publisher: A. Chuprov. In his obituary for Chuprov for the émigré *Russkii Ekonomicheskii Sbornik (Revue Economique Russe)* Rosenberg stresses repeatedly that Chuprov remained apolitical. More entensive information, however, is available in Sheynin (1996). There is a pamphlet published in Stockholm, 1919, entitled *La Décomposition du Bolchevisme* which is signed A. Tchouprov, Professeur d'Économie politique à l'Université de Moscou, on the mismanagement by the Bolsheviks of power and economy, with a stinging attack on Lenin. The fact that the "A. Tchouprov" who was "professor of political economy at Moscow University" was A.I., deceased in 1908, suggests that the pamphlet (not written in A.A.'s usual German) may be a provocation. The stay in

Stockholm also served to establish some prominence for Chuprov in the Scandinavian and English Statistical Schools, with publications in *Skandinavisk Aktuarietidskrift* and *Biometrika*.

He moved to Dresden in 1920, and after some years spent in solitary and intense productivity without steady income, he was invited in 1924 to the University of Christiania (now Oslo), and in the same year elected Honorary Fellow of the Royal Statistical Society. From his course of lectures in Christiania where his main contact appears to have been Alf Guldberg, arose Chuprov's (at the time) celebrated book published in 1925 as *Grundbegriffe und Grundprobleme der Korrelationstheorie*, in 1926 in a Russian version (with a new Foreword, dated Rome, 21 November, 1925); and in English translation in 1939. His influence in Scandinavia was now substantial, with several publications in *Nordisk Statistisk Tidskrift*, founded in 1922. He spent the Spring and Summer of 1925 in Prague, where he was appointed professor in the Russian Juridicial Faculty and associate of the Economic Cabinet of Prof. S.N. Prokopovich, editor of *Russkii Ekonomicheskii Sbornik* which appeared in Prague over the years 1925-1928, and was perhaps the most important academic Russian émigré journal of the post-revolution period. S.S. Kon, V.A. Rosenberg and P.B. Struvè, all now émigrés in the Russian colony in Prague, provided the necessary connections.

The émigré period was intensely productive for Chuprov. The earlier work on dispersion theory led to an extensive investigation of sample moments in terms of population moments (estimation by the method of moments), under, ultimately, very general conditions involving correlated observations, published in *Metron* in 1923. This contained an obvious application of such results to sample survey theory, anticipating several results of J. Neyman (q.v.), especially the well-known fomula for optimal allocation, which Chuprov obtained in the most elegant way: an application of the Cauchy-Schwarz-Buniakovsky inequality. (Neyman recognized Chuprov's priority in 1952). Work of such general nature led to Chuprov's propagation of the modern stochastic view of statistical theory: the sampling distribution for sample statistics, with inference based on conceptual repetitions of samples, and the Weak Law of Large Numbers. His lasting contribution to mathematical statistics rests on an early recognition of these fundamental ideas and their lucid and extensive popularization on the Continent. He is often credited with unifying several streams of statistical thinking: the Russian probabilistic; the German (typified by Lexis and Bortkiewicz and developing into the "Continental direction" of statistics); and that of the English

Biometric School of Galton and Karl Pearson (q.v.).

Almost unknown, because of publication in 1922-23 in a Russian-language Berlin-based émigré journal is some remarkable work on finite exchangeability by Chuprov and his student Ya. Mordukh (Seneta, 1987). The latter was helped to settle in London by Dr. Leon Isserlis, who was one of Chuprov's supporters in England. Others included J.M. Keynes, F.Y. Edgeworth (q.v.) and A.L. Bowley. In his 1921 *A Treatise on Probability*, Keynes speaks of 3 great Russian names in the general theory of statistics: Chebyshev (q.v.), Markov and Chuprov.

The Russian community in Prague reacted with great grief to the news of Chuprov's death. The *Russkii Ekonomicheskii Sbornik* printed the news in No.5 (1926), with a photograph on p. 5 followed by a black-bordered anonymous obituary on pp. 6-8, and Chuprov's brief autobiography followed by some supplementary biographical information on pp. 9-10. There was a public meeting on the 27 April 1926 in memory of him, and pp. 5-33 of No.6 (1926) were given over to obituaries by Rosenberg and Kon. Page 3 printed a Resolution of Condolence from the Royal Statistical Society. There was a similar meeting on 6 May 1926 in the USSR, with orations by Chetverikov, Slutsky (q.v.) and N.M. Vinogradova. Obituaries were later published in *Metron* by Chetverikov, and *Nordisk Statistisk Tidskrift* by Kohn (Kon) in particular, with *Biometrika* publishing a portrait. A.A.'s standing in the statistical world is well-expressed by the above-mentioned Resolution of Condolence (dated 16 June, 1926):

> "The premature death of Professor Tschuprow has deprived the world of an investigator whose contributions to science were admired by all and which did much to harmonise the methods of statistical research developed by continental and British workers."

References

[1] Eliseeva, I.I. Dmitriev, A.L. and Storchevoi, M.A. (eds.) *Aleksandr Aleksandrovich Chuprov (1874-1926).* [Proceedings of a conference on the 70th anniversary of his death, 27-28 November, 1996, in Russian.] St. Petersburg University of Economics and Finance, St. Petersburg, 1996.

[2] Seneta, E. (1982). Chuprov (or Tschuprow), Alexander Alexandrovich. *Encyclopedia of Statistical Sciences* **1**, 477-479. Wiley, New York.

[3] Seneta, E. (1985). A sketch of the history of survey sampling in Russia. *Journal of the Royal Statistical Society*, Series A, **148**, 118-125.

[4] Seneta, E. (1987). Chuprov on finite exchangeability, expectation of ratios and measures of association. *Historia Mathematika*, **14**, 243-257.

[5] Sheynin, O.B. (1996). *A.A. Chuprov: Life, Work, Correspondence.* Vandenhoeck and Ruprecht, Göttingen.

E. Seneta