**Oskar ANDERSON**
b. 2 August 1887 - d. 12 February 1960

**Summary.** A leading member of the Continental School of Statistics, Anderson contributed to a broad range of topics including correlation, time series analysis, nonparametric methods and sample surveys, as well as to econometrics and various other applications in the social sciences.

## 1. Biography

Oskar Anderson's life and work were strongly influenced by the very turbulent period in Europe in the first half of the 20th century. At various times he lived in Russia, the Ukraine, Hungary, Bulgaria and Germany. Oskar Johann Viktor (or in the Russian way of noting first names: Oskar Nicolaevich) Anderson was born in Minsk, the son of Baltic-German parents, and he spent his first 30 years in Russia. His father, Nicolai Carl, was a professor of Finno-Ugric languages at the University of Kazan.

Anderson graduated from the grammar school in Kazan with a gold medal and studied mathematics and physics at the University of Kazan for a year. In 1907 he entered the Economics Faculty of the Polytechnical Institute in St. Petersburg to study mathematics, statistics and economics. He soon became the disciple and assistant of the well-known statistician Aleksandr A. Chuprov (q.v) who let him participate in the field work for the population census of 1910. At the end of 1912 he was awarded the degree of "candidate of economics" (corresponding to a doctor's degree at an international level) for a dissertation on the coefficient of correlation and its application to time series. Soon afterwards he obtained a law degree of the University of St. Petersburg and in addition to his activities as assistant he taught economics and law in a commercial secondary school. He was married in 1912 to Margarethe Natalie, née von Hindenburg-Hirtenberg.

In the summer of 1915, as Chuprov's collaborator, he participated in a governmental scientific expedition to Turkestan where he worked as a sampling expert for an agricultural census in the artificially irrigated regions along the Sir-Daria River. This was one of the first sample surveys in official statistics.

After the decline of the Tzar's empire in 1917 and the beginning of the Russian revolution, Anderson moved to Kiev where he worked in a big cooperative centre's department of economic research. In 1918 he qualified for lecturing on mathematical statistics at the Kiev School of Commerce. At the

same time he became assistant to the director of the Demographic Institute of the Ukranian Academy of Sciences.

In 1919/20, when the Soviets had conquered the whole country, Anderson decided to escape with his wife and children. During the flight, at Noworossijks on the north coast of the Black Sea, and under dramatic circumstances, the manuscript of his thesis and the first version of his work on the difference method, including all his calculations, had to be left behind on the pier with some other luggage.

Travelling via Constantinople, where the couple had to work with their hands to earn a living, they eventually arrived in Budapest in 1921 and there Anderson founded a secondary school for the children of Russian immigrants. Then, from 1923 Anderson and his family lived in Bulgaria, where he found a stable life as a scientist. First he was appointed a member of the Bulgarian Supreme Statistical Council. From 1924 to 1934 he taught statistics and economics at the High School of Commercial Sciences in Varna.

In 1935 Anderson became director of the Statistical Institute for Economic Research of the State University in Sofia, which was partly sponsored by the Rockefeller Foundation, and at the same time counsellor of the Bulgarian General Direction of Statistics. His activities, however, reached beyond Bulgaria. In 1930 he was invited to Cornell University in the USA. He was one of the charter members and fellows of the Econometric Society, founded in 1930 in the USA. At the end of 1935 he went to Germany and England on a Rockefeller stipend. In 1936 he lectured at the London School of Economics, from 1935 to 1939 he was a member of the International Association of Institutes for Economic Research, and from 1936 to 1939 he served as an associate member of the committee of statistical experts of the League of Nations.

The Christian-Albrechts University in Kiel, Germany, appointed Anderson as Professor of Statistics in 1942. The appointment had a great influence on German university statistics and marked, after some stagnation, a revival of stochastic thinking. In addition to the professorship, Anderson was in charge of the Department of Eastern Studies at the Kiel Institute of World Economy. It is important to point out that Anderson never allowed politics to interfere with his scientific work. His moral integrity remained unquestioned.

In 1947 Anderson accepted appointment to the newly established Chair of Statistics at the Ludwig-Maximilians University in Munich where he continued his efforts to improve the academic teaching of statistics. He gathered a close group of disciples around him, particularly the future professors

Eberhard Fels, Hans Kellerer and Heinrich Strecker. His son Oskar (Jr.) also became a statistician and was appointed professor at the Universities of Mannheim and Munich.

## 2. Scientific Work

**Econometrics**

Anderson was convinced that mathematical-statistical methods are indispensable tools for research in economics and social sciences. In his early research he developed the variate difference method for analyzing time series independently but contemporaneously with W.S. Gosset ("Student")(q.v.). With the basic idea that time series consist of a systematic component (trend, business cycle) and a superimposed independent random component, one tries to completely eliminate the systematic part of the series by taking finite differences. After taking sufficient differences the random component is left. This procedure assumes independence of the random components. These are, however, especially with economic time series, sometimes autocorrelated. Therefore this method was subject to lively debate for decades, with many distinguished scientists participating. Anderson's initiative and the discussions thereafter contributed considerably to the subject.

The same is true for Anderson's criticism of statistical methods used for the so-called Harvard Barometer of Business Conditions which resulted in the replacement of purely empirical methods by more efficient ones. In his papers, Anderson demonstrated the arbitrariness of the methods predominant at that time. He helped to overcome the mechanistic view of business cycles and to further the idea that the scientific exploration of reality is not feasible without theoretical hypotheses. As a consequence the modern theory of economic model building was founded. Anderson dealt with the problem of empirically formulating theoretical relationships in his paper "Ist die Quantitätstheorie des Geldes statisch nachweisbar?" (1931), one of the earliest pieces of econometric research.

**Statistics**

There is hardly any field of statistical methodology of his time with which Anderson was not occupied. He brought with him to Bulgaria the experience gained in Russia, and with the sample survey in Turkestan. There he advocated the processing of data of the Census of Agriculture of 1926 by using random sampling techniques in addition to complete processing. The result of the comparison was amazingly good, thus demonstrating the effectiveness of sampling to all those statisticians who had not then accepted the method.

The representative processing of the census was one of the first official surveys in the world applying random sampling - which establishes Anderson as a pioneer of the first order.

Anderson directed special attention to the often neglected fact that data are subject to errors which are propogated in further evaluation or combination of data. He always stressed the necessity to observe and, if need be, to take account of error propogation. His studies on index theory, above all the use and abuse of chain index numbers should be mentioned, as well as his contributions to the problem of "price scissors", i.e. the divergent movement of agricultural and industrial prices.

Another focus of Anderson's research lay in causal analysis which gained interest in his time. He concentrated on the case of data which were not obtained by experiment but by observing economic and population development. He considered regression and correlation methods as appropriate tools, particularly regression analysis, for the empirical assessment of causal relations.

In his last years, Anderson dealt with the development of non-parametric tests. Such distribution-free tests are important since the normal distribution is commonly the exception rather than the rule in in socio-economic sciences. Anderson developed non-parametric tests of the null hypothesis in the case of autocorrelation and correlation.

In his publications, especially his two textbooks, Anderson combined the tradition of the so-called Continental School of statistics with the concepts of the Anglo-Saxon School. In his *Einführung in die mathematische Statistik* (1935), Anderson included the results of his research to that time and thus he became one of the outstanding modern representatives of the Continental School. His second textbook, *Probleme der statistichen Methodenlehre in den Sozialwissenschaften* (1954) may be regarded as his crowning scientific endeavour. As in all of his previous publications, Anderson gives highest priority to defining basic concepts and the exact formulation of methods to be applied.

After World War II and the end of the isolation of German scientists Anderson provided recommendations for lecture courses for the German Statistical Society giving a guide by which teaching and research could be brought to an international level. This helped the discipline to regain its reputation after a long period of stagnation. This was also assisted by Anderson's establishment of the *Mitteilungsblatt für mathematische Statistik* in 1949 together with Hans Kellerer and Hans Münzner. This journal was combined in 1958

with the *Statistiche Vierteljahresscrift*, published in Vienna, and continued by Anderson and Wilhelm Winkler under the heading *Metrika*.

Andersons scientific status was marked by many distinctions. He belonged amongst the scientists who paved the way for the application of quantitative methods in the socio-economic sciences and who developed tools in common use today. He was well aware of the difficulties in co-ordinating theory and practice. He warned of the danger that the best statistical technique could become useless if the model's assumptions are not met in reality or if they are applied to unreliable observations. His requirements remain true today.

# References

[1] Fels, E. (1978). Oscar Anderson. in *International Encyclopedia of Statistics*, Eds. W.Kruskal and J.Tanur, Vol. 1, pp. 1-3, Macmillan, New York and London.

[2] Kellerer, H., Mahr, W., Schneider, G. and Strecker, H., Eds. (1963). *Oskar Anderson, Ausgewählte Schriften*, 2 vols., Verlag J.C.B. Mohr (Paul Siebeck), Tübingen.

[3] Sagoroff, S. (1960). Oskar Anderson (1887-1960), *Journal of the Royal Statistical Society, Series A*, **123**, 518-519.

[4] Sheynin, O. (1996). A.A. Chuprov, Life, Work, Correspondence, paragraph 7.8: Anderson, pp. 58-60, *Applied Statistics and Econometrics*, **38**, Vandenhoeck &amp; Ruprecht, Göttingen.

[5] Strecker, H. (1965). Anderson, Oskar, Handwörtbuch der Sozialwissenschaften, **12**, Gustav Fischer Verlag et al., Stuttgart, Tübingen, Göttingen, pp. 509-512.

[6] Strecker, H. (1987). Anderson, Oskar Nikolayevich (1887-1960), *The New Palgrave, a Dictionary of Economics*, Vol. 1, Macmillan, London, pp. 93-94.

[7] Tintner, G. (1961). The statistical work of Oskar Anderson, *Journal of the American Statistical Association*, **56**, 273-280.

[8] Wold, H. (1961). Oskar Anderson 1887-1960, *The Annals of Mathematical Statistics*, **32**, 651-660.

Heinrich Strecker and Rosemarie Strecker