



Original Article

On the Intellectual Versatility of Karl Pearson

By

Richard H. Williams, Department of Educational and Psychological Studies, University of Miami

Bruno D. Zumbo, Department of Educational and Counseling Psychology, and Special Education, University of British Columbia

Donald Ross, Research Scientist, New York State Psychiatric Institute

Donald W. Zimmerman, Department of Psychology, Carleton University

Abstract

This paper displays the impressive versatility of Karl Pearson, focusing not only on his contributions to statistics and other quantitative disciplines but also on his research and publications in religion, politics, literary criticism, philosophy of science, Darwinism, biology, history, freethought, evolution, genetics, socialism, anthropology, eugenics, and emancipation of women. Being the chairman of a first class academic department and the managing editor of a major journal, Pearson sometimes used his power to the detriment of other important scientists, such as R. A. Fisher and Jerzy Neyman, and this paper also brings out this unfortunate characteristic of his personality.

In the year 2003, Karl Pearson is best remembered for his research in statistics, where he developed the formula for the product-moment correlation coefficient and introduced the chi square statistic. Occasionally it is recalled that he took a degree in law and wrote a book on the philosophy of science entitled *The Grammar of Science* (1892). These last two items, taken together with his statistical contributions, might give one a glimpse of his intellectual versatility. The main purpose of the pre-

sent paper is to display this versatility and elaborate on it in a fully comprehensive way. A secondary purpose is to reveal an unfortunate feature of Pearson's personality---viz., that he utilized his power and position to intimidate some fellow scientists, sometimes discouraging or even prohibiting promising lines of research, and furthering his own research interests, even when they proved to be cul-de-sacs (Haldane, 1957).

Karl Pearson was born on March 27, 1857

and died on April 27, 1936. His father was a successful Barrister and this may have influenced him in attaining a law degree. Karl was educated at home until he turned nine, and then studied at University College School, London, for seven years.

“In Pearson’s early educational history, there are indications of a phenomenal range of interests, unusual intellectual vigor, delight in controversy, the determination to resist anything which he considered misdirected authority, an appreciation of scholarship, and the urge to self-expression.” (Walker, 1968, p. 692)

Karl Pearson began his university work at King’s College, Cambridge in 1875 and graduated in 1879 in mathematics with high honors. He “...was awarded a Fellowship at the College extending from 1880 to 1886 that gave him financial independence without obligation and enabled him to travel and study as he pleased.” (Porter, 1994, p. 541)

He studied law in London and was called to the bar in 1881. A year later he was awarded a masters degree. Pearson traveled to Germany during his Fellowship period, studying at the Universities of Berlin and Heidelberg, focusing his attention on physics metaphysics, philosophy, Roman Law, biology, mediaeval and renaissance German literature, and Darwinism. Karl Pearson spent many hours in the Black Forest, studying and writing. As a result of these experiences, he became an expert on German literature and grew to be fluent in the German language, becoming a germanophile.

“After returning to England he was soon lecturing and writing on German social life and thought, on Martin Luther, Karl Marx, Maimonides, and Spinoza, contributing hymns to the Socialist Song Book, writing papers in the field of mathematics in King’s College, London, and engaging in literary duels with Mathew Arnold and the librarians of the British Museum.” (Walker, 1968, p. 692).

In 1884 Pearson was appointed Goldsmid Professor of Applied Mathematics and Mechanics at University College, London and in 1907

he became Head of the Department of Applied Mathematics. From 1891 to 1894 he was also Grisham College Lecturer in Geometry. As requested by Francis Galton, Karl Pearson became the first Galton Professor of Eugenics in 1911 and remained in that post until his retirement in 1933.

Karl Pearson and Maria Sharpe were married in 1890 and they had two daughters, Sigrid and Helga, and one son, Egon. The couple met at the Men and Women Club, which was co-founded by Pearson, and designed to permit free discussion among men and women. Maria died in 1928 and the following year he married Margaret Child, a colleague at University College.

The Heart of Karl Pearson’s Intellectual Versatility

By perusing Pearson’s academic studies in London and in Germany, one can sense the great variability in his interest patterns. We now look more closely at his writings, his research, and his publications.

He published 18 papers with the title “Mathematical Contributions to the Theory of Evolution,” all of them with different subtitles. They were all published in *Philosophical Transactions of the Royal Society*. The foundation of the system of Pearson curves appears in these publications. Substantively, they dealt with problems in genetics, anthropology, biology, eugenics, evolution, etc. Statistically, they provided theoretical contributions to the coefficient of contingency, tetrachoric and biserial coefficients, product moment correlation, chi square, kurtosis, the normal curve and other distributions, multiple correlation and regression, partial correlation, correlation ratio, scedasticity, coefficient of variation, and standard deviation. He coined this latter term and employed the Greek letter lower case sigma to denote its population parameter. Pearson contended that he called the LaPlace-Gaussian distribution the “normal curve,” which he later viewed as unfortunate because it seemed to imply that all other curves are “abnormal.” In

Pearson's first fundamental paper on correlation, "Mathematical Contributions to the Theory of Evolution: III. Regression, Heredity, and Panmixia" (1896), he derived the formula which we now call the "Pearson product moment correlation coefficient," and gave the coefficients of the multiple regression equation in terms of the zero-order correlation coefficients.

"Pearson produced more than 300 published works in his lifetime. His research focused on statistical methods in the study of heredity and evolution but dealt with a range of topics, including albinism in people and animals, alcoholism, mental deficiency, tuberculosis, mental illness, and anatomical comparisons in humans and other primates, as well as astronomy, meteorology, stresses in dam construction, inherited traits in poppies, and variability in sparrows eggs. Pearson was described by G. U. Yule as a poet, essayist, historian, philosopher, and statistician" (Lord, 1995, pp. 1557-1558).

Books edited or authored by Karl Pearson also reflect his intellectual versatility. Between 1922 and 1934 he edited tables for Statisticians and Biometricians, and tables of the Incomplete Beta Function, and the Incomplete Gamma Function. Francis Galton was Karl's mentor and his best friend. When he died, Pearson began work on a four volume biography of Galton entitled *The Life, Letters, and Labours of Francis Galton* (1914-1930).

The following two books, authored by Pearson, contain sections representing a lecture or an essay or a reprint of a publication in *Fortnightly Review*, *Modern Review*, *Mind: A Quarterly Review of Psychology and Philosophy*, or *Westminster Review*. The first book is entitled *The Chances of Death and Other Studies in Evolution* (two volumes, 1897). The second is *The Ethic of Freethought and Other Addresses and Essays* (1901). The former is comprised of "...essays on social and statistical topics, including the earliest adequate study ('Male and Female Variation') of anthropological populations using scientific measures of variability." (Eisenhart, 1974, p. 468). The latter deals with

"...free thought, historical research, and socialism..." (Eisenhart, 1974, p. 468) as well as with religion.

The Grammar of Science (1892) is perhaps Karl Pearson's magnum opus. Eisenhart (1974, p. 448) viewed Pearson's work as "...a remarkable book that influenced the scientific thought of an entire generation."

In 1908, the Russian revolutionary Vladimir Ilyich Lenin reacted to Pearson's book in the following way: "The philosophy of Pearson, as we shall repeatedly find, excels that of Mach in integrity and consistency" (Lenin, 1939, p. 119). He also said, "The Englishman, Karl Pearson, expresses himself with characteristic precision." (Lenin, 1939, p. 221) Lenin described Pearson as "...this conscientious and scrupulous foe of materialism." (Lenin, 1939, p. 243) It should be mentioned that Lenin disagreed with a number of Pearson's ideas.

In 1915, Jerzy Neyman, who became a world class statistician, was attending lectures on probability theory given by S. N. Bernstein, one of the great mathematicians of the first half of the twentieth century. One day Bernstein suggested to Neyman that he read a book entitled *The Grammar of Science* written by an Englishman, Karl Pearson. (Reid, 1982, pp. 23-24) He read it in Russian translation and very soon Neyman and his fellow students were passing it excitedly from one to another. They even found the titles of the chapters and the sections stimulating. It was as though the strong, confident voice from London were speaking to them directly.

Neyman said, "We were a group of young men who had lost our belief in Orthodox religion, not from any sort of reasoning, but because of the stupidity of our priests, [But] we were not freed from dogmatism and were prepared in fact to believe in authority, so far as it was not religious. The reading of *The Grammar of Science*...was striking because...it attacked in an uncompromising manner all sorts of authorities....At the first reading it was this aspect that struck us. What could it mean? We had been

unused to this tone in any scientific book. Was the work ‘de la blague’ [something of a hoax] and the author a ‘canaille’ [scoundrel] on a grand scale...? But our teacher, Bernstein, had recommended the book; we must read it again.” (Reid, 1982, pp. 23-24)

Although Neyman was not familiar with Pearson’s statistical work at that time, his thought processes became strongly influenced by Pearson’s *Grammar* and, according to Jerzy’s wife, Olga, he spoke of nothing but Karl Pearson, Karl Pearson, Karl Pearson. (Reid, 1982, p. 53).

In October of 1884, Karl Pearson was asked to edit and provide a preface to the incomplete manuscript, *The Common Sense of the Exact Sciences*. The author, William Kingdon Clifford, had died prematurely and some additional sections had to be added to complete the work. He successfully completed this book. It was reissued in 1946 and a new preface was written by Bertrand Russell in which he said: “At the time when I first read *The Common Sense of the Exact Sciences*, I had only lately heard of the possibility of geometries that contradicted Euclid; what I read in this book did much to diminish the bewilderment that I had been feeling. In spite of all the work that has since been done hardly anything that Clifford (or Karl Pearson) says on this subject could be bettered by a writer of the present day” (Clifford, 1946, pp. vi-vii of preface). Russell continued to make favorable comments of the book and of Pearson’s editorial work.

Just before the turn of the nineteenth century, the Syndics of the Cambridge University Press requested that Karl Pearson edit and complete the unfinished manuscript, *A History of the Theory of Elasticity and of the Strength of Materials from Galilei to Lord Kelvin* (two volumes). The deceased author, Isaac Todhunter, had left volume two incomplete, and a great deal of editorial work was needed. Each volume was a thousand pages in length and Pearson successfully completed the task in 1893.

Karl Pearson was co-founder, with Francis Galton and Walter Weldon, of the journal *Biometrika* in 1900. Pearson was its editor from its inception until he died in 1936. His son, Egon Sharpe Pearson, who was a well known statistician in his own right, took over the editorship at that time. *Biometrika* is a journal for the statistical study of biology. They formed this journal because the Royal Society refused to take papers that combined biology with mathematics. The reader desiring additional early biographical information on Karl Pearson cannot do better than Egon Sharpe Pearson’s *Karl Pearson: An Appreciation of Some Aspects of His Life and Work* Cambridge University Press (1938). Egon’s work, however, is uniformly positive regarding his father which, perhaps, is to be expected. Karl Pearson was also the editor of *The Annals of Eugenics* from its inception, in 1925, to 1933.

The Controversial Karl Pearson

“All power corrupts! It is impossible to be a professor in charge of an important department, and the editor of an important journal, without being somewhat corrupted. We can now see that in both capacities Pearson made mistakes. He rejected lines of research which later turned out to be fruitful. He used his own energy and that of his subordinates in research which turned out to be much less important than he believed.” (Haldane, 1957, p. 303)

“...Fisher...received an offer from Professor Pearson at the Galton Laboratory. Fisher’s interests had always been in the very subjects that were of interest at the Galton Laboratory, and for five years he had been in communication with Pearson, yet during those years he had been rather consistently snubbed. Now Pearson made him an offer on terms which would constrain him to teach and to publish only what Pearson approved. It seems that the lover had at last been admitted to his lady’s court---on condition that he first submit to castration. Fisher rejected the security and prestige of a post at the Galton Laboratory and took up the temporary job as sole statistician in a small agricul-

tural research station [viz., Rothamsted Experimental Station] in the country.” (Box, 1978, p. 61)

Fisher submitted an important paper to Pearson in which the sampling distribution of the correlation coefficient was investigated and it was rejected. In a debate with Jerzy Neyman in which Neyman was correct, Pearson left the room in anger saying, “That may be true in Poland, Mr. Neyman, but it is not true here!” (Reid, 1982, p.57) Neyman described Pearson as being hostile and sceptical. Major Darwin, a son of Charles Darwin, said that Pearson could not be treated like others because although he meant to be civil, he possessed an astounding negative attitude. He would allow nothing to be published which was inconsistent with his views or for which he personally could not find time to read. Once Pearson intimidated the editors of *The Journal of the Royal Statistical Society* and, as a result, they rejected a paper submitted by R. A. Fisher without providing explanation.

And yet, at one time Karl Pearson invited Jerzy Neyman and his wife, Olga, to the Pearson country home. Egon Pearson joined his father in welcoming the Neymans. “...Karl Pearson and Egon Pearson, and what was the name of Egon’s sister [Sigrid]---oh they all were wonderful people!” Olga Neyman recalls with enthusiasm. “This Karl Pearson invited us for several days to his country place. That was shortly after we came. They were extremely nice to us these Pearsons.” (Reid, 1982, p. 115)

What was Karl Pearson like [Reid] asked Mrs. Neyman? “Oh, he was wonderful! Like some old English duke, you know. Oh! A wonderful face.! Just pure blood English face you know. He was very tall, extremely beautiful old man. Just gentleman, very polite and nice. Oh, wonderful, wonderful!” Was Egon as impressive looking as his father? “No, no, no, no! But he was awfully nice.” (Reid, 1982, p. 115)

Concluding Comments

There is no doubt that Karl Pearson’s interests and abilities extended beyond statistics.

The generality of his interest patterns had already been noticed when he was a boy. But what can be said of his apparent “Doctor Jekyll and Mr. Hyde behavior?”

“...it is not difficult to reconcile Mrs. Neyman’s memories of gracious hospitalities on the part of Pearson with Neyman’s description of him as ‘hostile and skeptical’; for, as George Udny Yule wrote of K. P., the temper in controversy was the more remarkable because there was no such temper in relation to anything but matters intellectual.”

Correspondence to: Richard H. Williams, Ph.D., Professor of Educational and Psychological Studies, University of Miami, Coral Gables, Florida 33124, USA. Email: rwill4515@aol.com.

Note

1. Portions of this paper were presented at the Ninety-Third Annual Convention of the Southern Society for Philosophy and Psychology in New Orleans, Louisiana in April, 2001 by Professor Richard H. Williams.

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