**University of California: In Memoriam, 1992**

# Henry Felix Kaiser, Education: Berkeley

1927-1992
Professor, Emeritus

Henry F. Kaiser achieved worldwide eminence in psychometrics and statistical psychology. He ranks among the half dozen most creative and influential thinkers in his highly specialized field--factor analysis--in the second half of this century. On Tuesday, January 14, 1992, he died suddenly of a massive coronary. He was 64. He is survived by his wife, Joy Kaiser (née Preston), to whom he was married in 1949, and their two sons and a daughter.

Kaiser was born in Morristown, New Jersey. When he was six, he and his parents moved to California, where he received all of his formal education. With interruptions of his college education by service in both World War II and the Korean war, he earned the B.A., M.A., and Ph.D. degrees, all at Berkeley. In World War II, he served as an apprentice seaman in the U.S. Navy (1945), then as a cadet in the Coast Guard, followed by enlistment in the U.S. Naval Reserve (1947-48). He was a Navy Lieutenant in the Korean War (1948-51) and later held the same rank in the Naval Reserve (1951-67). Kaiser's considerable service in the U.S. Armed Forces is reminiscent of his great precursor, Charles Spearman (1863-1945), the inventor of factor analysis (in 1904), who attained the rank of major in the British corps of army engineers before he took up psychology.

After Kaiser received the Ph.D. in 1956, with a specialty in psychological and educational statistics and measurement, he stayed on the Berkeley campus for another year, as Instructor in the Department of Education. In 1957, he was appointed Assistant Professor of Education and Psychology at the University of Illinois, there attaining the rank of Professor in 1962. In 1965, he moved to the University of Wisconsin, as Professor of Educational Psychology. Later he was invited to return to Berkeley, and in 1968 he joined



the faculty as Professor of Education. It was most unfortunate that, beginning around 1980, he was increasingly beset by severe systemic health problems, which finally necessitated his taking early retirement in 1984 at age 56.

During the most productive period of his career, Kaiser received prestigious appointments as fellow at the Center for Advanced Study in the Behavioral Sciences (1961-62); Louis L.

Thurstone Distinguished Fellow, University of North Carolina (1964-65); and (after retirement from Berkeley) Fulbright Distinguished Professor of Computer Science, University of Zagreb, Yugoslavia (1986). He was a fellow of the American Psychological Association and a member of the National Council on Measurement in Education. He enjoyed the distinction of being elected president of the three most important organizations in his field: the Psychometric Society, the Society of Multivariate Experimental Psychology, and the American Statistical Association (Illinois Chapter).

Kaiser was first and foremost a quantitative methodologist in the behavioral sciences, not an empirical, data gathering investigator. His substantive and topical interests in psychology and education were entirely incidental to his interest in the contribution that could be made to empirical research by the rigorous and optimal quantitative treatment of data. His principal contributions in this respect involve the mathematics of factor analysis. But the immense influence of his work in this highly specialized and complex field can scarcely by fully appreciated by anyone but experts, although Kaiser's name per se, and particularly the name of the computerized technique called *Varimax*, that he invented for transforming factors, are widely recognized by behavioral scientists throughout the world. His many journal articles, written mostly for advanced specialists in the field, are characterized by their originality, mathematical ingenuity, and a writing style of crisp clarity, incisiveness, and brevity. Among the 110 publications in his bibliography, a relatively small number of path-breaking articles were the basis of his eminence. The four most seminal of his contributions account for two-thirds of all his citations in the *Science Citation Index* and the *Social Science Citation Index*. These articles have been cited over the years in the behavioral-sciences literature with extraordinary frequency, and in modern textbooks of factor analysis Kaiser's work is cited more often than that of any other figure in the whole history of the field. His Ph.D. dissertation (“The Varimax Criterion for Analytic Rotation in Factor Analysis”) published in 1958 in the leading journal of quantitative psychology, *Psychometrika*, became a “citation classic.” With

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over 1,300 journal citations, it is the third most often cited article in psychological literature.

Factor analysis is a class of mathematical procedures aimed at identifying the basic dimensions of *factors* that underlie the relationships, or correlations, among a large number of variables. Kaiser's aim when he began work in this area in the mid-1950s can be given in his own words: “Factor analysis will eventually come out of the realm of strange, mystical, ad hoc, half-art, half-science sort of numerology into the camp of reputable methodologies because of the possibility of attacking factor-analytic problems in a mathematically respectable fashion through the use of high-speed computers.” Despite the unavoidable technical terminology, Kaiser's several major contributions toward this goal deserve at least brief mention here. (1) *Varimax*, which has long been a household word at computer centers throughout the world, is a computerized algorithm for the objective, or analytic,

transformation (orthogonal rotation) of factor axes to approximate Thurstone's criterion of “simple structure” to the maximum extent allowed by the data. He later devised a computer algorithm for oblique rotation, allowing for correlated factors and hierarchical analysis. (2) He developed objective, analytic criteria for communality estimation, a mathematical rationale for determining the number of factors in a correlation matrix (the Eigenvalues >1 rule), and an index (“Measure of Sampling Adequacy”) of the degree to which a given correlation matrix lends itself to a meaningful factor analysis. (B) His pioneering article “Applications of Electronic Computers to Factor Analysis,” played a major role in bringing the electronic computer into use in the behavioral and social sciences. (4) He developed a general computer package (“Little Jiffy”) for performing orthogonal and oblique factor analysis that incorporates many of the features he had contributed to the rigorous mathematical underpinnings and refinement of factor-analytic techniques. (5) He invented a method known as *alpha factor analysis*, which mathematically relates factor analysis to the well-known Kuder-Richardson formulation of test reliability and provides estimates of factors having maximum generalizability.

As a teacher, Kaiser was most admired and appreciated by those graduate students who came to his courses with a genuine interest in psychometric science and a strong aptitude and background in mathematics and statistics. Several have themselves become well-recognized figures in quantitative psychology and have publicly acknowledged their indebtedness to his influence. Kaiser was unstinting in his guidance of the most interested and ablest students,

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and was always immensely helpful, even after formal retirement, to colleagues who sought his advice on technical problems involving factor analysis, in which his knowledge and authority were encyclopedic. None could have doubted that they were dealing with an absolute master of his field. Yet he was never out to impress, although in his realm his intellectual brilliance was obvious.

Relatively few academicians, however competent they may be, show a touch of creative genius. Kaiser did. But with this quality there often comes a certain eccentricity. It would betray Kaiser's own conspicuous honesty to disguise the fact that he was a true eccentric, a “character” in the colorful sense, even literally--for instance, he painted his shoes with an aerosol spray can to make them any unconventional color he happened to prefer at the time; and when listing his formal degrees, as in biographical directories, he usually added “E.S.” (for Eagle Scout), after the Ph.D., as his highest degree. And he was notorious for the “Memos” he frequently distributed to the education faculty--always sharp, often hilarious, but occasionally (when written in a moment of pique) scathing and insulting to someone's ideas, attitudes, or values. Though quite seriously religious (Episcopalian) and outspokenly conservative in politics, he was an irreverent, radical iconoclast in academic affairs. To those who knew him well, probably the most memorable and endearing feature of

his character was the utter absence of guile, pretense, or façade. His great openness was indeed somewhat unusual. It was not at all like that of the outgoing extrovert, for he was actually a rather shy introvert. But it was as if nothing he felt as really important in his life, intellectually or emotionally, was ever hidden from others' view.

Arthur R. Jensen Mark Wilson

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