

## **Duncan, Otis Dudley (1921-2004)**

One of the most influential sociologists in history, Otis Dudley Duncan was instrumental in transforming mainstream American sociology into a quantitatively-based empirical social science in the second half of the twentieth century. His key scholarly contributions include the introduction of path analysis to social science; the measurement of occupational socioeconomic standing with an index (Duncan Socioeconomic Index); the study of intergenerational occupational mobility; the spatial analysis of residential patterns; the application and advancement of loglinear models and Rasch models for categorical social science data; and a landmark treatise on social measurement (Duncan 1984).

Duncan's best known work is a 1967 book that he coauthored with the late Peter Blau, *The American Occupational Structure*. Based on quantitative analyses of the first large national survey of social mobility in the United States, the book elegantly depicts the process by which parents transmit their social standing to their children, particularly through affecting the children's education. The book's impact went far beyond its analyses of occupational mobility. Using survey data and statistical techniques, it showed how an important sociological topic could be analyzed effectively and rigorously with appropriate quantitative methods. The work helped inspire a new generation of sociologists to follow suit and pursue quantitative sociology. Today a worldwide community of sociologists specializing in social stratification and social mobility still work on elaborating the Blau-Duncan model to include such additional factors as cognitive ability, race, and social context in studying the transmission of social standing from one generation to the next.

Duncan introduced path analysis to social science. A path diagram and a corresponding path model describe a set of equations summarizing complex scientific ideas in terms of statistical relationships. Path analysis was first invented by Sewell Wright, a renowned biologist and evolutionary theorist. Duncan discovered Wright's method of path analysis by chance and then applied it to sociology. Together with Arthur Goldberger, an eminent econometrician, he showed that path analysis models were closely related to the simultaneous equation models of economics and the confirmatory factor analysis of psychology. These three different ways of analyzing certain kinds of data can be viewed within a single general framework called "structural equation models." Later in his career, Duncan concentrated his methodological interests on loglinear models and Rasch models for categorical data.

In his last book *Notes on Social Measurement, Historical and Critical*, Duncan (1984) shifted his attention to social measurement and presented his general philosophy of social science. With a broad historical overview from ancient Greece to the present, Duncan commented on the historical development of social measurement and identified the difficulties of quantitative analyses in the social sciences, wherein variability is the norm rather than the exception. In this book, Duncan also presented himself as a fierce critic of the quantitative approach. This change in Duncan's methodological thinking can be traced to his realization that population heterogeneity renders statistical analyses of social science data essentially descriptive rather than causal (Xie 2007). Indeed, avoidance of drawing law-like causal statements from statistical analyses became the hallmark of the intellectual tradition in quantitative sociology that is associated with Duncan. He was openly disdainful of the search for supposedly universal laws of society that would mimic those of physical science. The central tenet in Duncan's new paradigm for quantitative sociology is the primacy of empirical reality.

Duncan was born on December 2, 1921 in Nocona, Texas and grew up in Stillwater, Oklahoma. He completed a BA at Louisiana State University in 1941, and an MA at the University of

Minnesota in 1942. He then served three years in the United States Army during World War II before completing his PhD in sociology at the University of Chicago in 1949. He was on the faculty in the Departments of Sociology at The Pennsylvania State University, and the University of Wisconsin, the University of Chicago, the University of Michigan, the University of Arizona, and the University of California, Santa Barbara, from which he retired in 1987. He died of prostate cancer in Santa Barbara in 2004.

Duncan was elected to membership in The National Academy of Sciences, The American Academy of Arts and Sciences, and The American Philosophical Society. He was also awarded honorary degrees by the University of Chicago, the University of Wisconsin, and the University of Arizona. He was President of the Population Association of America in 1968-1969.

#### Bibliography

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Xie, Yu. 2007. "Otis Dudley Duncan's Legacy: the Demographic Approach to Quantitative Reasoning in Social Science." *Research in Social Stratification and Mobility*.