

## REFERENCES

- Ackoff, R. L. and Emery, F. E. On purposeful systems. Chicago: Aldine-Atherton, 1972.
- Asher, H. B. Causal modeling. In E. M. Uslaner (Ed.), Quantitative applications in the social sciences. Beverly Hills: Sage, 1976.
- Atteneave, F. Applications of information theory to psychology. New York: Henry Holt and Co., 1959.
- Bellack, A. A., Kliebard, H. M., Hyman, R. T. and Smith, F. L. The language of the classroom. New York: Teachers College Press, 1966.
- von Bertalanffy, L. General system theory. New York: George Braziller, 1968.
- von Bertalanffy, L. General systems theory. Main Currents in Modern Thought, 1955, 11, 4, 75-83.
- Blalock, H. M. Causal inference, closed populations, and measures of association. American Political Science Review, 1967, 61, 130-136.
- Blalock, H. M. (Ed.) Causal models in the social sciences. Chicago: Aldine, 1970.
- Carnap, R. The elimination of metaphysics through logical analysis of language. In A. J. Ayer (Ed.), Logical positivism. New York: The Free Press, 1959, 60-81.
- Churchman, C. W. The systems approach. New York: Dell, 1968.
- Cochran, W. G. The distribution of the largest of a set of estimated variances as a fraction of their total. Annals of Eugenics, 1941, 11, 47-52.
- Collett, L. S. and Semmel, M. I. The analysis of sequential behavior in classrooms and social environments: Problems and proposed solutions. Bloomington: Center for Innovation in Teaching the Handicapped, Indiana University, 1973.
- Coombs, C. H. A theory of data. Psychological Review, 1960 67, 143-159.
- Coombs, C. H., Dawes, R. M., and Tversky, A. Mathematical psychology. Englewood Cliffs, NJ: Prentice Hall, 1970.

- Costner, H. L. Criteria for measures of association. American Sociological Review, 1965, 30, 3, 341-353.
- Cronbach, L. J. and Snow, R. E. Individual differences in learning ability as a function of instructional variables. Report to the U.S. Office of Education, 1969.
- Dudycha, A. L. and Dudycha, L. W. Behavioral statistics: An historical perspective. In R. E. Kirk (Ed.), Statistical issues. Belmont, CA: Wadsworth, 1972, 66-78.
- Duncan, O. D. Path analysis: Sociological examples. American Journal of Sociology, 1966, 72, 1-16.
- Dunkin, M. J. and Biddle, B. J. The study of teaching. New York: Holt, Rinehart and Winston, 1974.
- Fink, A. H. An analysis of teacher-pupil interaction in classes for the emotionally handicapped. Unpublished doctoral dissertation, University of Michigan, 1970.
- Fisher, R. A. Statistical methods and scientific inference. New York: Hafner, 1956.
- Fisher, R. A. The design of experiments. Edinburgh: Oliver and Boyd, 1966.
- Fisher, C. W., Berliner, D. C., Filby, N. N., Marliave, R., Cohen, L. S., Dishaw, M. M. and Moore, J. E. Teaching and learning in the elementary school: A summary of the Beginning Teacher Evaluation Study. San Francisco: Far West Lab, 1978.
- Flanders, N. A. Analyzing teacher behavior. Reading, MA: Addison-Wesley, 1970.
- van Fraassen, B. C. The scientific image. Oxford: Oxford University Press, 1980.
- Frick, T. W. Nonmetric temporal path analysis: The theoretical basis of data queries in Project CARTLO. Bloomington: Center for Innovation in Teaching the Handicapped, Technical Report 4.1, Indiana University, 1980.
- Frick, T. W. MICRO-CARTLO program documentation. Bloomington: Center for Innovation in Teaching the Handicapped, Technical Report 4.3, Indiana University, 1981.
- Frick, T. W. Nonmetric temporal path analysis: An alternative to the linear models approach to verification of educational relations. Bloomington: Indiana University, Unpublished manuscript, 1982.

- Frick, T. W. and Rieth, H. J. ALTOS observer reference manual: Academic Learning Time Observation System. Bloomington: Center for Innovation in Teaching the Handicapped, Indiana University, 1981.
- Giere, R. Objective single case probabilities and the foundations of statistics. In P. Suppes, L. Henken, A. Joja and Cr. C. Moisil (Eds.), Logic, methodology, and philosophy of science IV. Amsterdam: North Holland, 1973.
- Giere, R. A Laplacean formal semantics for single-case propensities. Journal of Philosophical Logic, 1976, 5, 321-353.
- Giere, R. Propensity and necessity. Synthese, 1979, 40, 439-451 (a).
- Giere, R. Understanding scientific reasoning. New York: Holt, Rinehart, and Winston, 1979 (b).
- Giere, R. Statistics and science. Bloomington: Unpublished manuscript, Indiana University, 1982.
- Glass, G. V., Wilson, V. L. and Gottman, J. M. Design and analysis of time-series experiments. Boulder: Colorado Associated University Press, 1975.
- Goodman, L. A. The multivariate analysis of qualitative data: interactions among multiple classifications. Journal of the American Statistical Association, 1970, 65, 225-256.
- Goodman, L. A. A general model for the analysis of surveys. American Journal of Sociology, 1972, 77, 1035-1086.
- Goodman, L. A. Causal analysis of data from panel studies and other kinds of surveys. American Journal of Sociology, 1973, 78, 1135-1191 (a).
- Goodman, L. A. The analysis of multidimensional contingency tables when some variables are posterior to others: A modified path analysis approach. Biometrika, 1973, 60, 179-192 (b).
- Goodman, L. A. Exploratory latent structure analysis using both identifiable and unidentifiable models. Biometrika, 1974, 61, 215-231.
- Goodman, L. A. Analyzing qualitative/categorical data. Cambridge, MA: Abt Books, 1978.
- Hartley, H. O. The maximum F-ratio as a short-cut test for heterogeneity of variance. Biometrika, 1950, 37, 308-312.
- Hays, W. L. Statistics for the social sciences. (Second Edition) New York: Holt, Rinehart, and Winston, 1973.

- Heise, D. R. Causal inference from panel data. In E. F. Borgotta and G. W. Bohrnstedt (Eds.), Sociological methodology. San Francisco: Jossey-Bass, 1970, 3-27.
- Jöreskog, K. G. A general approach to confirmatory maximum likelihood analysis. Psychometrika, 1969, 34, 183-202.
- Jöreskog, K. G. Simultaneous factor analysis in several populations. Psychometrika, 1971, 36, 409-426.
- Jöreskog, K. G. Analyzing psychological data by structural analysis of covariance matrices. In R. C. Atkinson, D. H. Krantz and R. D. Suppes (Eds.), Contemporary developments in mathematical psychology, Vol. II. San Francisco: W. H. Freeman, 1974.
- Kaplan, A. The conduct of inquiry. Scranton, PA: Chandler, 1964.
- Kerlinger, F. N. and Pedhazur, E. J. Multiple regression in behavioral research. New York: Holt, Rinehart, and Winston, 1973.
- Kirk, R. E. Experimental design: Procedures for the social sciences. Belmont, CA: Brooks/Cole, 1968.
- Kuhn, T. S. The structure of scientific revolutions. Chicago: The University of Chicago Press, 1970.
- Lakatos, I. Criticisms and the methodology of scientific research programmes. Proceedings of the Aristotelian Society, 1968, 69, 149-186.
- Maccia, E. S. Information theory model. In E. S. Maccia, G. S. Maccia, and R. E. Jewett, Construction of educational theory models. Washington, DC: Office of Education, Department of Health, Education and Welfare, 1963.
- Maccia, G. S. Epistemological considerations of educational objectives. Proceedings of the XVth World Congress of Philosophy, Varna, Bulgaria, 1974.
- Maccia, E. S. and Maccia, G. S. Development of educational theory derived from three educational theory models. Final Report, Project No. 5-0638, U.S. Office of Education, 1966.
- Maccia, E. S. and Maccia, G. S. On the contribution of general systems theory to educational research. Paper presented at the Society for General Systems Research, Boston, 1976.
- Medley, D. M. The effectiveness of teachers. In H. J. Walberg and P. L. Peterson (Eds.), Research on teaching. Berkeley, CA: McCutchan, 1979.
- Medley, D. M. and Mitzel, H. E. Measuring classroom behavior by systematic observation. In N. L. Gage (Ed.), Handbook of research on teaching. Chicago, IL: Rand-McNally, 1963.

- Morgan, J. N. and Messenger, R. C. THAID: A sequential analysis program for the analysis of nominal scale dependent variables. Ann Arbor: Survey Research Center, Institute for Social Research, University of Michigan, 1973.
- Neyman, J. and Pearson, E. S. Joint statistical papers. Berkeley: University of California Press, 1957.
- Pearson, K. Notes on the history of correlation. Biometrika, 1920, 13, 25-45.
- Reynolds, H. T. Analysis of nominal data. In E. M. Uslaner (Ed.), Quantitative applications in the social sciences (7). Beverley Hills, CA: Sage, 1977.
- Rieth, H. J. and Frick, T. W. An analysis of academic learning time (ALT) of mildly handicapped students in special education service delivery systems: Initial report on classroom process variables. Bloomington: Center for Innovation in Teaching the Handicapped, Indiana University, 1982.
- Schlick, M. Positivism and realism. In A. J. Ayer (Ed.), Logical positivism. New York: The Free Press, 1959, 82-107.
- Schmidt, S. A. Measuring uncertainty. Reading, MA: Addison-Wesley, 1969.
- Sonquist, J. A., Baker, E. L., and Morgan, J. N. Searching for structure. (Revised Edition) Ann Arbor: Institute for Social Research, University of Michigan, 1973.
- Steiner, E. Logical and conceptual analytic techniques for educational researchers. Washington, DC: University Press of America, 1978.
- Stevens, S. S. Mathematics, measurement, and psychophysics. In S. S. Stevens (Ed.), Handbook of experimental psychology. New York: Wiley, 1951, 1-49.
- Suppe, F. Theories, their formulations and the operational imperative. Synthese, 1973, 25, 129-164.
- Suppes, P. What is scientific theory? In S. Morgenbesser (Ed.), Philosophy of science today. New York: Basic Books, 1967.
- Wald, A. Sequential analysis. New York: Wiley, 1947.
- Weinberg, G. M. An introduction to systems thinking. New York: Wiley, 1975.
- Wiener, N. Cybernetics. New York: Wiley, 1948.
- Wright, S. Correlation and causation. Journal of Agricultural Research, 1921, 20, 557-585.

## VITA

Theodore Wayne Frick was born on February 20, 1948, in Huntington, Indiana. He attended elementary, junior high and high school in Nappanee, Indiana, graduating in 1966 as co-valedictorian. He began attending Indiana University that fall, majoring in music education. In 1971 he received the B.M.E. His interest in educational research led him to pursue graduate level work in 1971 also at Indiana University. For three years he was a research assistant at the Center for Innovation in Teaching the Handicapped (CITH), School of Education, Indiana University, where he worked on numerous research and development projects, including the Computer-Assisted Teacher Training System (CATTS), and Project PRIME, a large scale research study of mainstreaming in the state of Texas. While at CITH he wrote several grant proposals, two of which were funded between 1976 and 1980. He became a full time research associate at CITH, as co-principal investigator on Projects CARTLO (Computer-Assisted Research into Teaching-Learning Outcomes) and COMAVI (COMputer-Mediated Assessment of Videotaped Instruction). In these projects he designed, developed and evaluated multi-media instructional materials and computer software for teacher education in special education. From 1980 to 1983 he served as project coordinator in a CITH study of the academic learning time of mildly handicapped students, where he was primarily responsible for observer training, observational data analysis and inservice teacher education.

During the last ten years he has presented at numerous national conventions and published several articles, the most notable of which is "Observer Agreement and Reliabilities of Classroom Observational Measures," Review of Educational Research, 1978.