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Subject--A Comparison of the Complexity of Testing Thematic Hypotheses in the Physical Sciences and the Social Sciences.

Author -- Frederick B. Wood, Ph.D., Electrical Engineer
Office Address -- P.O. Box 85, Campbell, California (After January 1, 1966 address will be: P.O. Box 5095, San Jose, California 95150)

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The relative complexity of the testing of thematic hypotheses in different fields of science is reviewed. The term "thematic hypothesis" refers to a fundamental generalization as defined by philosophers of science such as Dr. Gerald Holton(1). The increasing complexity of the testing of hypotheses is examined as we procede from physical-chemical phenomena to biological phenomena to psychological and sociological phenomena. The philosophy of general systems theory is used to compare the requirements for testing an example from physical science, namely Einstein's special theory of relativity, with a psychological-sociological hypotheses, namely R. B. Lindsay's "thermodynamic imperative."(2)

The review of the experimental evidence of the special theory of relativity is based upon W. K. H. Panofsky's matrix of rows of theories versus columns of experiments(3). The structuring of such a table for a "thematic hypothesis" such as the "thermodynamic imperative" is found to be more complex. First moving to biological phenomena increases the complexity in that in addition to the simple matrix for testing hypotheses, an evolutionary time scale has to be added. Then moving to psychological-sociological phenomena, a third factor increases the complexity, namely the existence of many different human cultures on our planet, so that some cross-cultural test must be applied to prevent the researcher from being blind to some factors which are assumed or screened out by the culture in which the researcher is embedded. There is a further complication in that important national and international decisions are being made on the basis of thematic hypotheses which have not been adequately tested. It is important that tentative ways be developed to test important hypotheses like the "thermodynamic imperative", before it develops into a political ideology, so that rational use can be made of such hypotheses to conserve human values.

Now the application of a principle ofthe Society for General Systems Research 'Statement of Purpose', namely "To investigate the isomorphy of concepts, laws and models in various fields, and to help in useful transfers from one field to another," leads to an ordering of the three aspects of testing of "thematic hypotheses" in the social sciences. Two examples of the "thermodynamic imperative" which indicate the possibility of measurement have been derived by analogy from electrical communication theory (cybernetics and information theory), namely the discrete channel as applied to the comparison of the degree of democracy in different states or countries (4), and

the continuous channel(5) as applied to the comparison of the degree of "dynamic-justice" in a set of countries in an international system.(6) These two models from electrical communication theory appear to be important links in relating the three aspects of testing more general hypotheses such as the "thermodynamic imperative." Further the credibility of these complex systems for testing sociological hypotheses can be enhanced by another perspective of cybernetics, namely a three dimensional frame for cybernetic models and technologies organized by size, complexity and degree of quantization(or dynamic to static).(7) The results of this study do not constitute a proof, but they give us better insights as to the complexity of testing thematic hypotheses so that we can more quickly procede with the job of testing and using the "thermodynamic imperative."

References:

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2. R. B. Lindsay, The Role of Science in Civilization, N.Y.: Harper & Row(1963). See also Bernard Baumrin, editor, Philosophy of Science - The Delaware Seminar, vol. 2(1962-1963). N.Y.: Interscience Publishers(1963), pp. 411-448, "Physics, Ethics and the Thermodynamic Imperative." For a preliminary development see R. B. Lindsay, "Entropy Consumption and Values in Physical Science," American Scientist, 47, 376(1959). Also, S. Polgar, "Evolution and the Thermodynamic Imperative," Human Biology, 33, 99, (1961). Also, William Malamud, "Psychiatric Research: Setting and Motivation," The American Journal of Psychiatry, Vol. 117, No. 1, July, 1960.

3. W. K. H. Panofsky and Melba Phillips, Classical Electricity and Magnetism, Reading, Mass.: Addison-Wesley Publishing Co.(1955) pp. 230-242.

4. F. B. Wood, "Negentropy and the Concepts of Freedom, Democracy and Justice," paper presented at Society for General Systems Research with Section L of AAAS, Cleveland, December 27, 1963.

5. Claude Shannon, The Mathematical Theory of Communication, Urbana: University of Illiois Press(1949).
See also Colin Cherry, On Human Communication, N.Y.: Wiley(1957)

6. F. B. Wood, "A General Systems Theoretic Model for the Estimation of the Negentropy of Sociological Systems through the Application of Two Isomorphic Electrical Communication Networks." paper presented at First International Congress of Social Psychiatry, London, August 17-22, 1964.

7. F. B. Wood, "Cybernetics and Public Order," paper presented at Symposium on Cybernetics and Society, Georgetown University, Washington, D.C., November 19-20, 1964.

FREDERICK B. WOOD
SAN JOSE, CALIF. 95125