

"Construction and Testing of Hypotheses"

by

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Abstract

An example of the testing of hypotheses in science is presented in the form of Panofsky's tabel of the experimental evidence for Einstein's Special Theory of Relativity. Then a start is made in the construction of similar tables for reviewing the status of applying concepts from Information Theory to sociological systems. In particular a start is made in tabulating the status of analogies of "negentropy" as discussed in SEPR's Nos. 20-D, 88-B, 91, 96, etc.

Since this is an index, a paper space is provided for the reader to enter his comments in the black boxes.

THIS IS AN INDEXING SERVICE

The philosophical "tools" of these reports (which are presented as working hypotheses which may take some years to test. I feel that the problems of survival of our civilization are important enough to risk premature discussion of hypotheses which have not been thoroughly tested in order to make the ideas available to other people who may be better prepared to test the hypotheses than I. For a more recent series of papers on hypotheses in science, I refer you to some work of Professor Gerald Holton. (2)

2. Socio-Engineering Problems Reports:

SEPR No. 20-D, "An Experiment In how An Individual In A Business Society Can Become 'An Interpreter Of Science In Terms Of Human Needs'." 12/15/63-3/14/64 (1p)

SEPR No. 28-B, "Negentropy and the Concepts of Freedom, Democracy and Justice." 8/25/63- 12/27/63 (41pp)

SEPR No. 91, "Four Philosophical 'Tools' For Improving Our Insights Regarding The Problems of Disarmament." 11/12/63 (33pp)

3. Gerald Holton, "Thematic and Phenomenic Hypotheses: Concepts for Re-evaluating Historic Stages in Physical Science," paper delivered at 10th International Congress for the History of Science, Cornell, Aug. 30, 1962. (See also similar paper at A.A.A.S. Meeting, Philadelphia, Dec 1962)

4. Gerald Holton, "On the Thematic Analysis of Science: The Case of Poincaré and Relativity," in Colloquia Philosophica et Scientifica, Vol. II, Publication XIII in Histoire de la Pensée, Paris: Hermann (1964), pp. 257-266.

22. Review of the Structure of the Quality of Logical Systems
 (and analogs) in Engineering, Sociology, and Political Problems.

TELEGRAPH SYSTEMS (& Computer Communication Systems)

Set of n messages or instructions with probabilities (p_j) of being sent.
 Negentropy or measure of information (H)

$$H = - \sum_{j=1}^n p_j \log_2 p_j$$

TRANSFER BY ANALOGY
 SEPR Nos
 63-C, 65-D,
 87-B

SOCIOLOGICAL SYSTEMS

Set of m human freedoms with probabilities (G_j)
 Negentropy or measure of Democracy:

$$D = - \sum_{j=1}^m G_j \log_2 G_j$$

SEPR
 Nos 88-B, 91.

SAMPLE CALCULATIONS

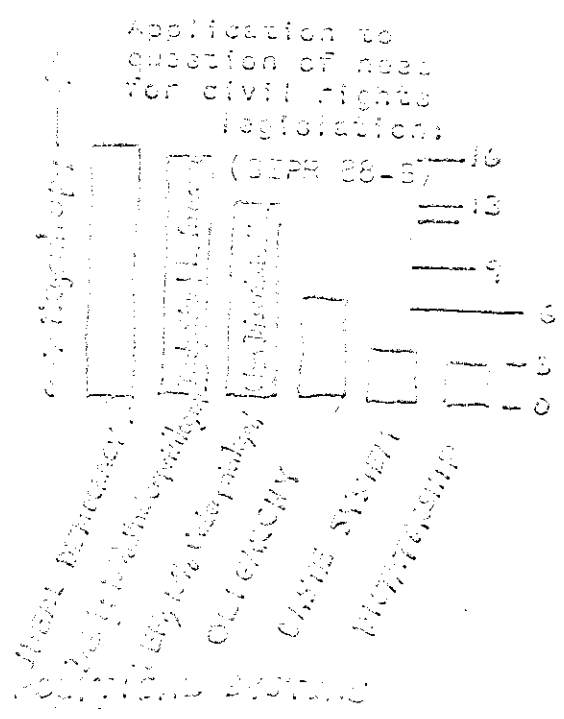


Fig. 1. Calculated by author and sample calculations.

When these concepts are tested against more complex data by sociologists and political scientists, the use of negativity as a measure of democracy could lead to a useful measure in dealing with concrete problems like civil rights, job discrimination, freedom of religion, and freedom of speech.

When developed further to the proposed concept of "dynamic justice," the conditions of minimizing negativity could lead to a useful measure in analyzing international problems and in particular disarmament problems.

III. Status of These Approaches in Sociological and Political Areas.

Fig. 3 is an attempt to evaluate the extent to which the hypotheses of this paper agree or disagree with known relative values and other known conditions or variables. Potential future developments are also listed in the table, even though not much can be said about them yet. The references noted in Fig. 3 are:

4. Jerome A. Kuznetz, Communication, Organization, and Science. Indian Hill, Colorado: Research Wing Press (1953)
5. Miroslav O. Mesarovic, The Control of Hierarchical Systems. Boston: Technology Press (1956)
6. H. Kuhn-Kahay, "The Set Theory of Recursion and Homotopies." University of Illinois, NSF Grant 25,48, Tech. Report No. 7, Sept. 1962.

Hypothesis	Category	Priority	Impact	Effort	Cost	Time	Risk	Feasibility	Value
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2. [Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]
3. [Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]
4. [Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]
5. [Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]
6. [Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]
7. [Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]
8. [Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]
9. [Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]
10. [Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]	[Illegible]

The table of testing of hypotheses in Fig. 4 is from SEPA No. 92-3. Another chart as a more comprehensive table is shown as Fig. 5 which includes the major technical and philosophical as the hypotheses to be tested. Another set of hypotheses are tabulated for future testing in Fig. 6. These hypotheses are grouped by their relation to the three areas of energy, power, and information (communication).

Fig. 5. Testing of hypotheses.

The table of testing of hypotheses in Fig. 4 is from SEPA No. 92-3. Another chart as a more comprehensive table is shown as Fig. 5 which includes the major technical and philosophical as the hypotheses to be tested. Another set of hypotheses are tabulated for future testing in Fig. 6. These hypotheses are grouped by their relation to the three areas of energy, power, and information (communication).

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SOCIO-ENGINEERING PROBLEMS REPORT NO. 58-A

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