

COMMUNICATION THEORY in the CAUSE of MAN

VOL I NO 9

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EDITORIAL NOTES

When questions are brought to my attention regarding the hypotheses in this series, I plan to print the questions and my response to the questions in this section. If the questions are stated in the form of a letter to the editor, the complete letter will be published subject to the space limitations and relevance rules stated in Vol. I, No. 7-8, p.4. If important questions are brought up informally, or the author doesn't want to be directly quoted, I shall abstract the question, and print the question in this section along with my response to the question.

LETTER TO THE EDITOR

May 3, 1971

Fred, your works provoke plenty thought, but do not motivate me to action in my world.

Warm regards,

J.B.

P.S.: You use terms entropy, conservation, communication for classes of concerns that I call intellectual-systematic. I lean towards social and moral terms for classes of concerns that are emotional, motivational and spiritual(somehow synthesis with rational (scientific) concerns): social order, power, skill at winning, skill at brotherhood....

REPLY TO LETTER

My response to J.B.'s comments above is that thirty years ago I did speak more in social and moral terms about my concerns for the problems of mankind. Working as an electrical engineer for five years on military weapons projects, for six years as combination graduate student and research engineer on military projects, and then nineteen years in industry has subjected me to a sufficient level of pressure to give up talking about social concerns. At times I have had administrators and managers tell me that I should learn to put blinders on to avoid seeing the social problems of our society. In the long run, this pressure to convince engineers to put blinders on may have a beneficial effect, in that in my case, it has pushed me to look for more powerful intellectual tools that might be useful in analysing social problems. For example the potential relationship between maximizing negentropy and Albert Schweitzer's principle of "reverence for life" may ultimately give J.B. and others who talk more in social and moral terms more powerful tools to help solve the social problems of the world.

F.B.W.

QUESTIONS

Question 5: A reader complained that the article "Perspective" in CTCM Vol. I, No. 5-6, mentioned the existence of a youth drug culture without including a warning of the dangers of drug abuse.

Preliminary Response: I considered making some editorial comment on the hazards of drug abuse, but decided that I needed to study the problem more deeply, before making any statements. I have written to various institutions and individuals doing research on drug abuse and have obtained various suggestions as to books and reports that are relevant. As a result I have studied carefully the following references:

National Clearinghouse for Mental Health Information, U.S. Dept. of H. E. and W., Resource Book for Drug Abuse Education, Chevy Chase, Maryland, October 1969, 117 pp.

Joel Fort, Pleasure Seekers, The Drug Crisis, Youth & Society, N.Y.: Bobbs-Merrill(1969).

Richard Blum and Associates, Drugs I: Society and Drugs. S.F.: Jossey-Bass Publishers, 1969. 400 pp.

Richard Blum and Associates, Drugs II: Students and Drugs. S.F.: Jossey-Bass Publishers, 1969. 399 pp.

In the Resource Book(above), I found the following articles of particular importance:

Richard H. Blum, "Motivations for Student Drug Use." RBDAE, pp. 79-82.

Winfield W. Salisbury and Francis R. Fertig, "The Myth of Alienation and Teen-Age Drug Use: Coming of Age In Mass Society." RBDAE, pp. 83-86.

The studying of the above material doesn't make me an expert on drug abuse. However, I find that my engineering background gives me an attitude of looking at the total social system in order to find reasons for this widespread problem of drug abuse.

Also from my background in electrical communication theory, I have a feeling for the phenomena of the information rate exceeding the channel capacity of the system. From experience in the computer industry, I have a certain confidence that definable systems can be simulated at least on a small scale.

My background in mathematics leads me to look for the equivalent of a completeness theorem to be sure that the tools and concepts I am using are capable of representing the total social system to the accuracy required. From my background in physics I am aware that there is no single correct view of nature, but that the principle of complementarity gives us complementary theories in which one theory explains some phenomena, while other phenomena are better explained by a complementary theory. My experience in psychotherapy, group therapy, encounter groups, and psychodrama leads me to balance appreciation of spontaneous human responses to situations with alertness for the feedback from the environment which inhibits or stimulates people. From the interaction of these different elements in my background, and through the process of "technological meditation" (see File 215, CTCM I/1-2 p. 19) I have developed the outlook of Section 1.5.0 in this series as a base from which to start a search for a more coherent explanation fo the reasons for widespread drug abuse.

Further Response: For more details on my approach to understanding the problems of drug abuse, see the next section in this issue: Section 1.5.0: Complex Problems Involving Cybernetics, Information Theory, Sociology and Many Other Fields (Syzygy).

Our civilization is going through a syzygy in which a number of forces for change are lined up to give maximum effect at the same time. I borrow the word "syzygy" from astronomy where it means the nearly straight line configuration of three celestial bodies such as the earth, moon, and sun during a lunar or solar eclipse.

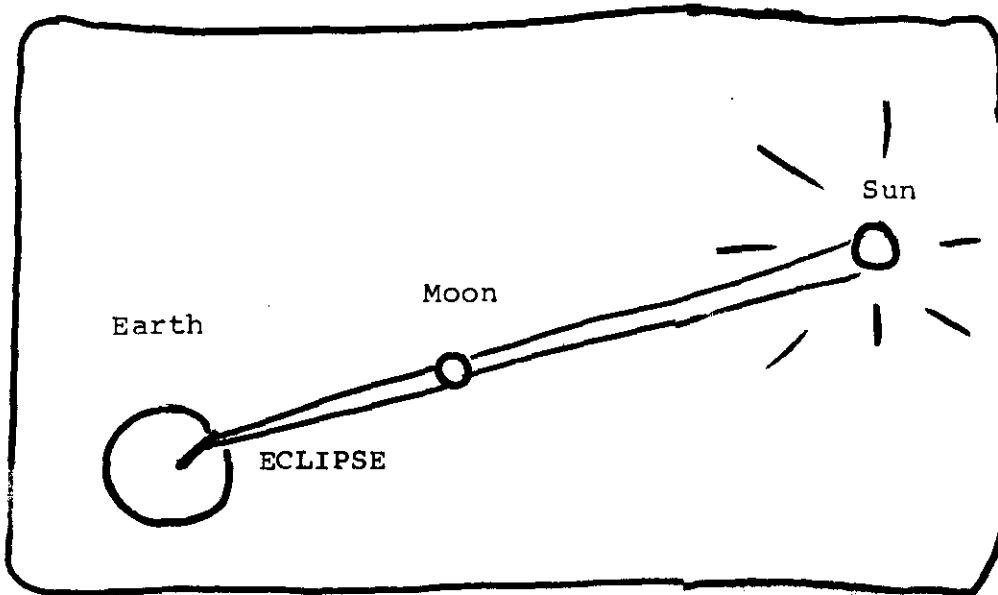


Fig. 1-A An Astronomical Syzygy During an Eclipse of the Sun

In primitive societies where people didn't understand astronomy, an eclipse could have catastrophic effects on social organization. In our highly specialized and credentialed society we are almost as bad off in regard to understanding a sociological syzygy as were primitive societies in regard to understanding astronomical syzygys. We need a few multi-disciplinary scientists who can bridge the gaps between the different social sciences and the social sciences to help us identify what the forces are in this sociological syzygy. The major danger to civilization is that during the time we are passing through a syzygy, some group might launch a war against a mistakenly identified enemy of human civilization and thereby run the risk of destroying human life on this planet when the war reached the stage of releasing atomic and hydrogen bombs. My intent in this section of CTCM is to make some preliminary guesses as to the nature of the elements in this sociological syzygy in order to stimulate multi-disciplinary and inter-disciplinary thinking on the subject.

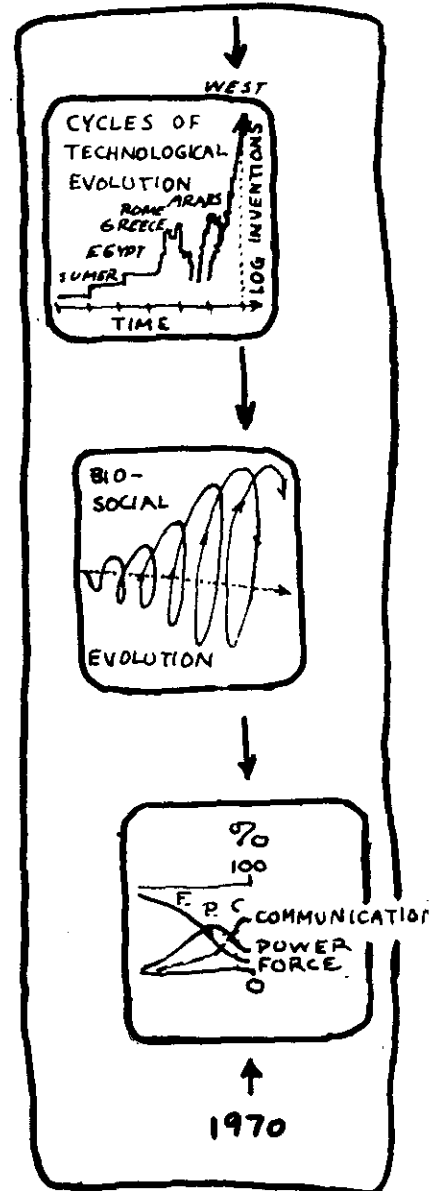


Fig. 1-B A Sociological Syzygy Due to the Time Coincidence of Maximum Changes or Turning Points in Technological Change, Bio-Social Evolution, and the Ratios Between Force, Power and Communication.

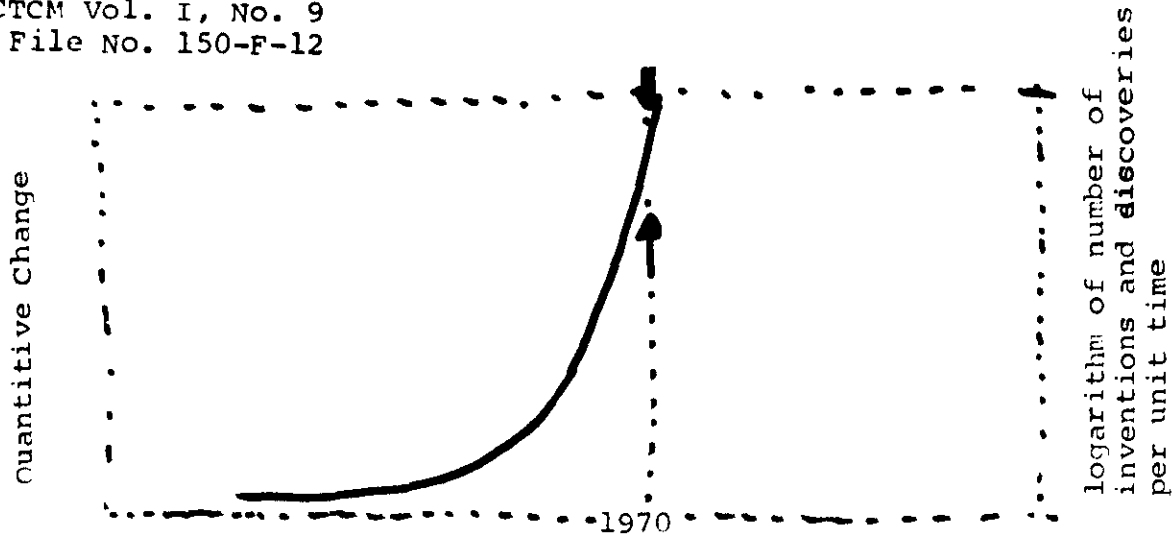


Fig. 2A - Scientific and Technological Evolution

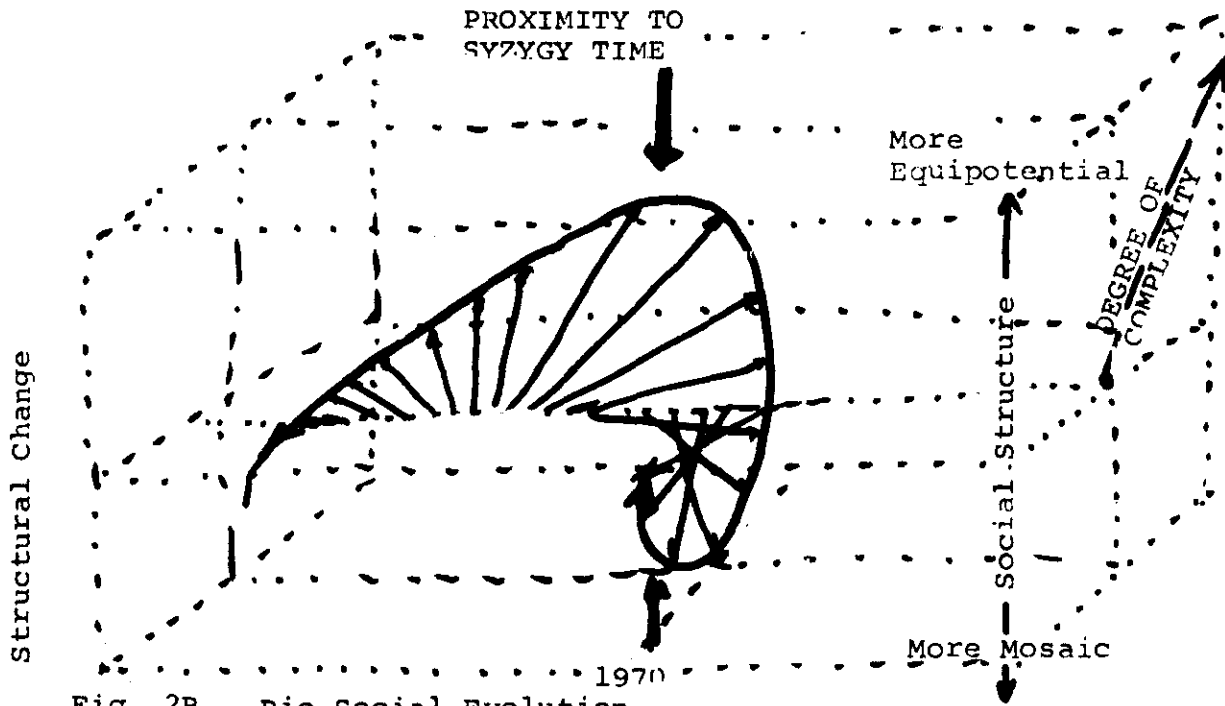


Fig. 2B - Bio-Social Evolution

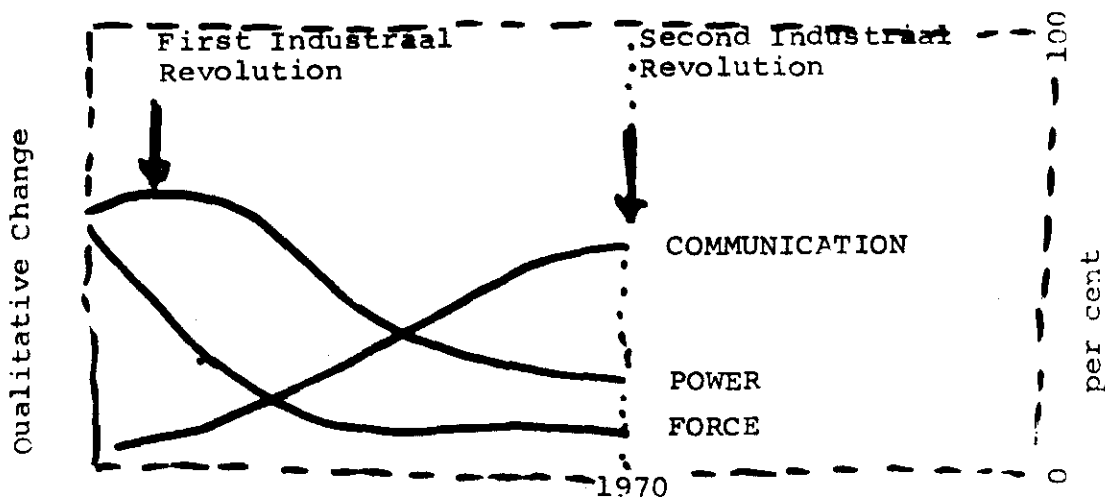


Fig. 2C - Fractions of Economic Effort Devoted to Force Amplifying, Power Amplifying, and Communications Processing Activities

In Fig. 1-A, we are able to show the earth, moon, and sun in one diagram in terms of their physical positions. At this stage of our understanding of complex sociological phenomena, we lack a common coordinate system for illustrating a sociological syzygy. We have to plot each component separately as a function of time. Furthermore the functions in a sociological syzygy do not have the same units of measurement, so the best we can do at present is to draw three separate diagrams and place them adjacent to each other as in Fig. 1-B.

The three parts of Fig. 1-B are drawn in more detail in Figs. 2-A, 2-B, & 2-C. These illustrate the three major changes which I tentatively refer to as the factors which have reached critical points, maxima, or unprecedented magnitudes -- all at the same period in history. These curves are all quite inaccurate, but are useful as first approximations for stimulating discussions of the nature of the crises that face our civilization.

Fig. 2-A shows the exponential rise of the number of inventions and scientific discoveries. This unprecedented rise in technological change has a multitude of beneficial and disturbing effects on social organization. (For more detailed curves, see Section 2.1.2). This rapid rate of technological change has made possible a rapid rise in the standard of living of the societies on the planet who have developed the educational systems to train the scientists and engineers to maintain the technological process. The development of radio communication and then television resulted in the young people in the technologically advanced countries receiving information at a rate higher than the natural channel capacity of human beings. This is illustrated in Fig. 3-A. (The curve of output information rate versus input information rate is derived from the data presented by Dr. James G. Miller in "Information Input Overload and Psychopathology" in American Journal of Psychiatry, Feb. 1960, pp. 695-704.) The fact that the older people in these same countries grew up without television sets a basic predisposition for a more severe generation gap. The younger people have to reject a large fraction of the information presented to them in order to survive. Marshall McLuhan has perceived some of the features of this problem in Understanding Media.

The young people who have been pushed beyond their channel capacity, subconsciously try various techniques to compensate or get away from the information input overload conditions. They may try to reform the world, or they may drop out to join an alternative society, or they may adopt some ideology which compresses or abstracts the information for them, or they may accept the potential brain damage related to overspecialized training provided by the establishment educational institutions, or they may develop ways to use computer programs to sort and/or compress data to bring it within their channel capacity, or they may develop applications of general systems theory to overlap fields of knowledge in a coherent way that reduces their information input overload and at the same time broaden their field of competence, or they may experiment with drugs to destroy the tight connections with reality to get compensating brain damage chemically instead of educationally. The overspecialization brain damage derived from the educational process may be less permanent due to the availability of techniques such as individual psychotherapy, group therapy, psychodrama, and encounter group procedures to help individuals find alternate paths for

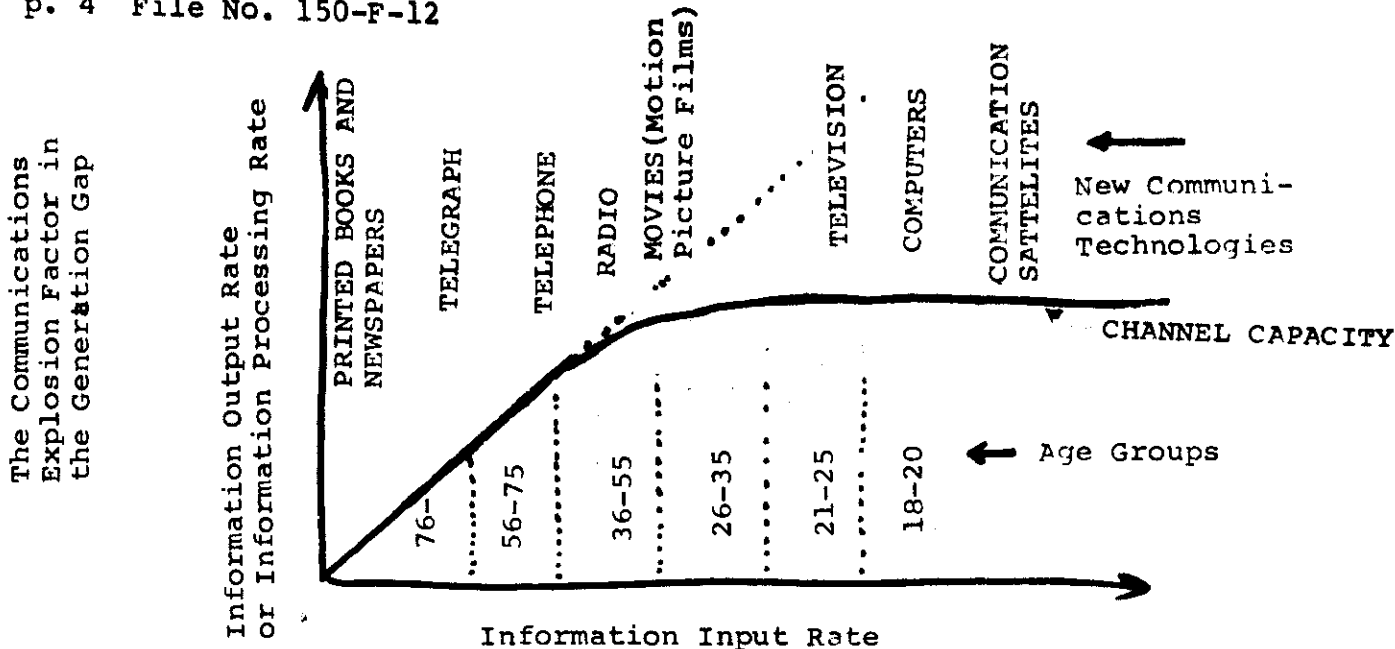


Fig. 3-A Information Input Rate versus Information Output Rate Showing Effective Channel Capacity of Human Beings

A person aiming at specialization in the professions particularly needs a varied background of education for physiological reasons, quite apart from the humanities. ...Dr. N. E. Ischlondsky, Paris and New York specialist in brain physiology, told a meeting of the Commonwealth Club in San Francisco:

"Only a broad general education will provide the future specialist with the wide net of brain connections indispensable to integrative thought." (*)

Dr. Ischlondsky postulates that there are ample physiological reasons for steering clear of narrow specialization:

"If the brain of a growing individual is being developed one-sidedly, this may lead to such an intense stimulation of a very restricted portion of the cerebral cortex, the seat of finer psychic reactions and discriminations that induction emanating from it may greatly inhibit the rest of the brain.

"There results not merely a lack of development of the affected areas, but also a decline in their normal functioning capacity," Dr. Ischlondsky added.

* Mental Health Progress, Dept. of Mental Hygiene, Sacramento, Calif., Vol. 13, No. 9, page 9, November 1962.

Fig. 3-B The Danger of Specialization

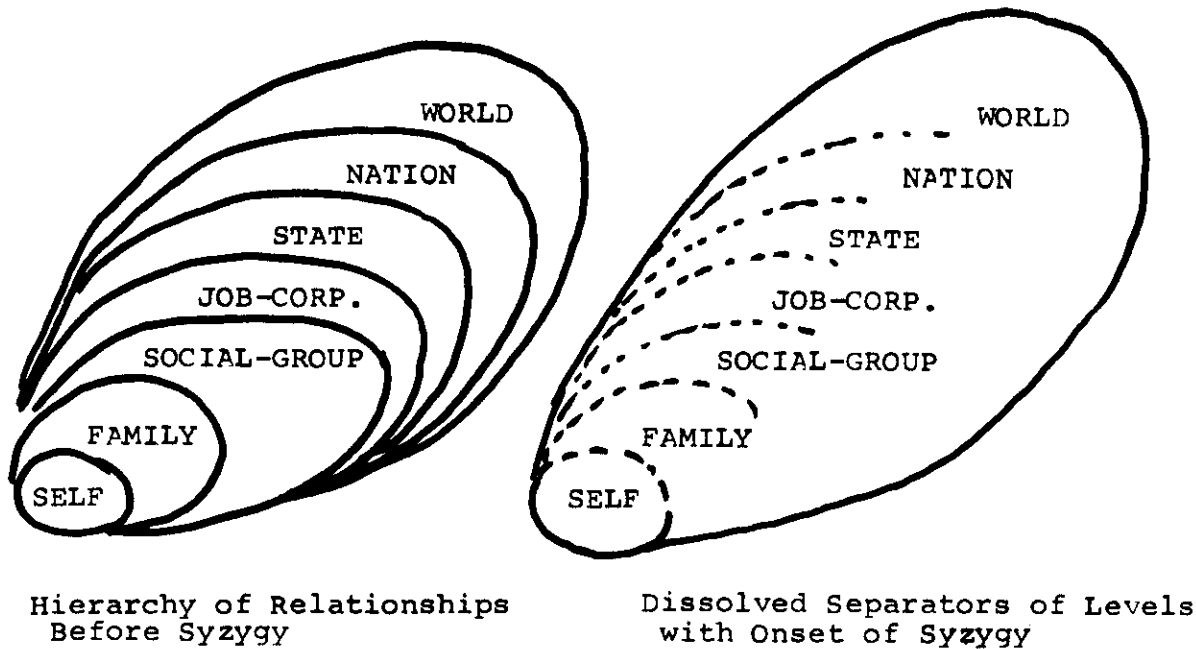


Fig. 3-C Effect of Syzygy and Advent of
Television Impact on Youth.

expression of their psychological potentials. Unfortunately we do not have adequate techniques to correct for LSD induced brain disorganization. It is possible that future historians may perceive that the drug abuse epidemic of the 1960's was the natural response of people under information input overload conditions to do their part, even though self-destructive, in helping to maintain a homeostatic balance on the surface of the earth, by working to sabotage the irresponsible, but technologically advanced countries.

I feel that we should help our youth find alternative ways to work for the survival of the human race that are not self-destructive.

The second disturbing feature entering the sociological syzygy is the stage we are in on the spiral of bio-social evolution shown in Fig. 2B. (To piece together this spiral, one has to have a background understanding of the cyclical theories of the ancient Hindus, a brief contact with Aristotle's study of the cycles through which many city states evolved; Sorokin's socio-cultural dynamics, Bergson's theory of the socio-metabolic transition, Karl Marx's Capital, Clark Kerr's Industrialism and Industrial Man, Galbraith's The New Industrial State, and possibly Edgar Dunn's Economic and Social Development) The decision rules developed for our large corporation enterprises were accurately developed to match a straight line approximation to a small segment* of the spiral curve, but are failing to fit the changing conditions as the straight line for which they were developed departs further from the spiral curve of evolution. An important element in the development of the new industrial state is the brain damage generated in the brains of the technicians, engineers, and middle managers who are trained to be overspecialized. The brain damage described by Dr. N. E. Ischlondsky in Mental Health Progress Dept. of Mental Health Sacramento, Calif., Vol. 13, No. 9, p. 9, November 1962 is described in Fig. 3B.

* See CTCM I/1-2 p. 12, Fig. 3 (File 121)

The third factor in the sociological syzygy, namely the impact of communication processes taking over a dominant factor in the economic social and political life of the technologically advanced countries has become particularly important since a generation of youth have grown up with television. The growth of communication processes in our society coupled with the pushing of the youth beyond the channel capacity of their nervous systems has had effects that are mixed blessings. The youth have become more aware of the problems of the whole world, while at the same time they are less able to carry out their ethical views due to being pushed beyond their channel capacity.

Before the onset of the sociological syzygy, our young people moved through a hierarchy of levels in their development as is illustrated in Fig. 3-C. A child had the opportunity to first concentrate on developing himself in relationship to the local environment. As he developed he had more interactions with his family. At a later stage in school he learned to relate to a broader social group. Then after high school or college he learned to take responsibility on his job. After becoming 21, he learned more about his state and community so he could vote intelligently. As he matured he became more aware of the problems of his nation and eventually he learned more about the problems of the whole world. Our system was structured so that the individual could gradually expand his horizon to learn about successively larger segments of the planet. Before he was old enough to vote, he could have confidence that the adults who were voters had accumulated some experience so that the older people would be making rational decisions about the problems of the world while he was becoming mature enough to take his part in the decision making.

With the advent of the syzygy the young people have been bombarded by an order of magnitude more information about the whole world than their parents had thrown at them. The young people are overwhelmed with the responsibility for the whole world, particularly where they see their parents and other old people in authority making the problems of the world worse instead of taking rational steps toward solution of the problems of our civilization. The effect of the bombardment of information via television, as illustrated in Fig. 3-C (right hand section), is that the boundaries between the different levels of the hierarchy have been almost dissolved. The use of communication satellites for transmission of telephone messages and television programs is already bringing the less industrially developed countries into the same problems of the sociological syzygy. If we solve these problems, we will have a one world community.

The anthropologist, Margaret Mead, has analyzed an important segment of these problems in her book: Culture and Commitment - A Study of the Generation Gap, N.Y.: Natural History Press/Doubleday & Co. (1970). I am not as optimistic as Margaret Mead about the development of the "prefigurative culture" which she discusses. However, I will do my part in making the scientific tools that we have accumulated available to the youth who take on the responsibility for developing the "prefigurative culture."

This section is a historical account of my interest in the problem of the social responsibility of engineers. The development of my outlook through high school, college, World War II, graduate school, and work in the computer industry is briefly traced in respect to the question of social responsibility. It will be seen that the obstacles to exploring questions of social responsibility in our American social and political system forced my attention toward the possibility of multidisciplinary research with emphasis on a search for analogies that might come from cybernetics and information in the form of a spin-off from my work in the computer industry. Thus the obstacles may have refocused my vision in a more fruitful direction.

While in high school, I was deeply concerned over whether the capitalist economic system was capable of handling economic crises. I felt that the basic difficulty was the lack of feedback of critical information in time for the small businessman to make adequate decisions. I didn't know whether the problem was more of a technological one, or whether it was a sociological problem. The question was whether we needed the technological developments to provide the information feedback, or whether we should design an economic system which could better survive under conditions of inadequate information feedback. Since I didn't know which was more significant, I wavered for a while as to which subject to major in at college. The question was whether it would be more useful to major in the social sciences, or in engineering or physics.

While participating in the high school students group at the Berkeley Unitarian Church, I met a number of professors and research scientists. From my contacts with economists, historians, and sociologists, I concluded that the social sciences had inadequate means of testing hypotheses. I decided that I needed to stay closer to subjects where I could find a way to test hypotheses. Also I observed that the university social scientists who seemed to be more astute in observing what was happening in our society were excluded from the councils of the National Industrial Conference Board and the National Association of Manufacturers so that they did not have reliable data with which to test any new hypotheses. Also I noted that these social scientists were remote from where the action was in regard to the sources of social change, namely the application of new technology.

Therefore for two reasons I decided to major in electrical engineering: (1) to keep my feet on the ground where one could verify facts and test hypotheses -- such as in engineering, where one can build electronic circuits to test one's theories, and (2) to be at the right place in our social system to be able to observe the impact of new technology on social processes.

As the Spanish Civil War became more of a weapons testing ground for Hitler and Mussolini and the Japanese penetrated farther into Manchuria, the situation looked more like a potential world war again. With the beginning of World War II in 1939, my electrical engineering studies became more oriented toward applying new technology to the development of new microwave devices that might lead to weapons or control systems to help the democratic countries survive. In the summer of 1940 I quit a summer power engineering job to switch to a communication engineering job on microwave tube development that was of interest to the U.S. Army Signal Corps for potential use in radar.

"The engineer may be regarded, therefore, as an interpreter of science in terms of human needs and a manager of men, money, and materials in satisfying these needs." Engineers' Council for Professional Development. (from a 1942 E.C.P.D. pamphlet)

The mention of "human needs" raises many sociological questions.

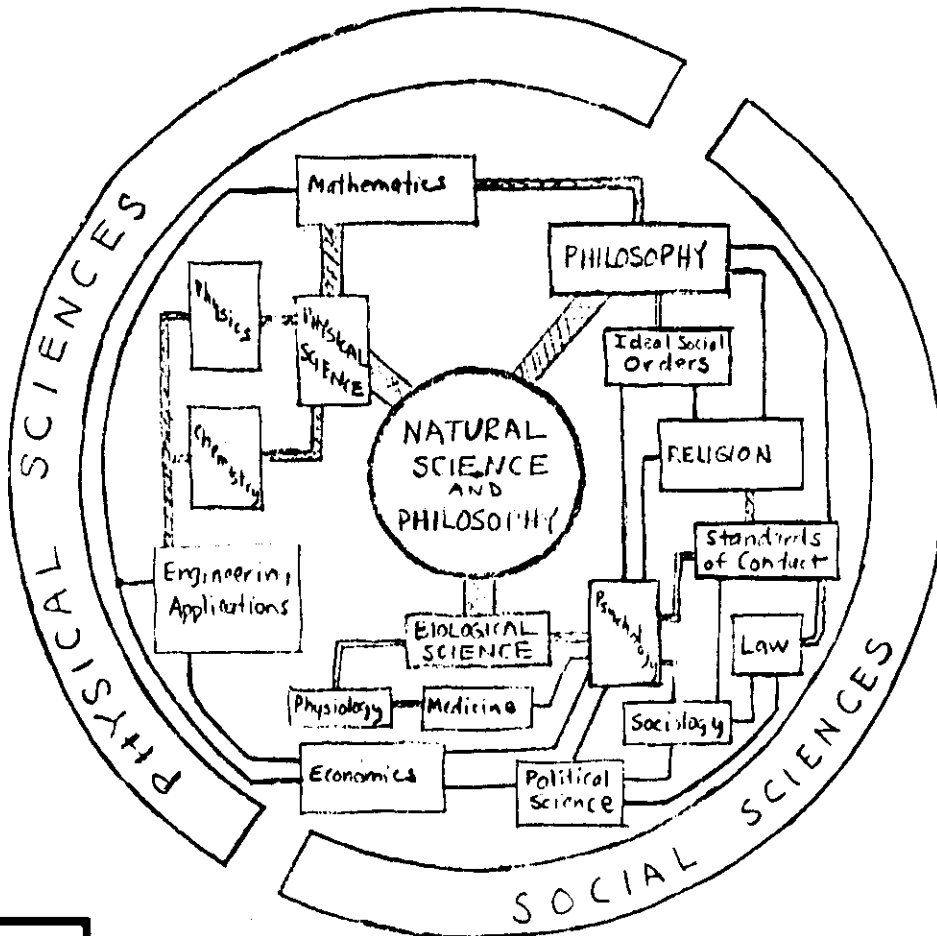


Fig. 1

A preliminary attempt to organize a synthesis of the specialized fields of science to assist the engineer in developing an interpretation of science in terms of human needs.

The above figure (Fig. 1) represents my approach to developing a perspective of my work as an engineer in relation to the rest of society in the period 1939-1940 as I was making the transition to specialize on more specific weapons development to assist the democratic countries in our fight against the fascist countries who were attacking our heritage of Western Civilization.

During this period I had to struggle with another problem. I found that as I continued in the advanced R.O.T.C. courses to be prepared to help defend our country in the event that the U.S. was drawn into World War II, I seemed to become less sensitive to human feelings and was becoming more of an automaton -- more like the Nazi soldiers who were our potential enemy.

To combat this hardening of my attitudes, I had to work out some arrangements to maintain contact with the long range goals of our evolving civilization so that I would not be converted (or coopted) by the immediate needs of society. While studying electrical engineering at the University of California, Berkeley, I attended social science seminars at the Student YMCA-YWCA and meetings of the Channing Club of the Unitarian Church to maintain a perspective of the long run trends in our civilization.

I found that the chart of Fig. 1 was quite useful in helping me maintain a perspective. I first used the chart in Berkeley while on the program committee of the Channing Club at the Berkeley Unitarian Church to help insure that we got speakers from all the major sectors of the diagram. When working at the M.I.T. Radiation Laboratory the principle of this chart helped me select which lectures at M.I.T. and Harvard to attend evenings and on special occasions. While concentrating on the engineering development of radar, I was able to hear distinguished professors such as Sorokin from sociology, Lewin from psychology, Schumpeter from economics, Darrow from physics and philosophy of science, Hansen from mathematics and engineering, Wiener from mathematics and control systems, plus a number of Protestant, Roman Catholic, Jewish, Quaker, and Unitarian religious leaders.

After a while the question occurred to me: Do the ideas of these scientists and religious leaders fit any coherent pattern that might help us understand how our civilization is changing? During one year at the M.I.T. Radiation Laboratory, I collected notes on the principal ideas discussed in a series of meetings at the Arlington Street Church in Boston to see if there was any correlation apparent between different speakers and discussions. I found that a three-dimensional chart like Fig. 2 was useful in organizing the ideas. I made a three-dimensional model with a toy Erector set and clipped cards with ideas on the "skyscraper" framework at the intersection of the column and floor that seemed to fit.

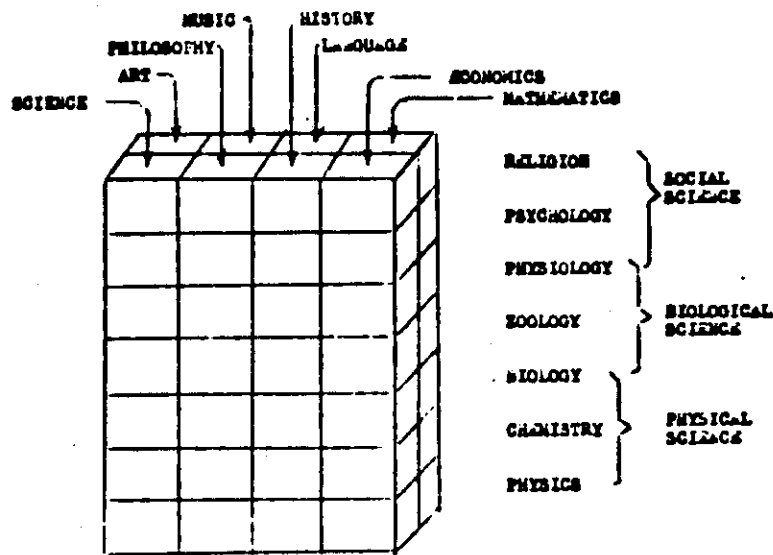
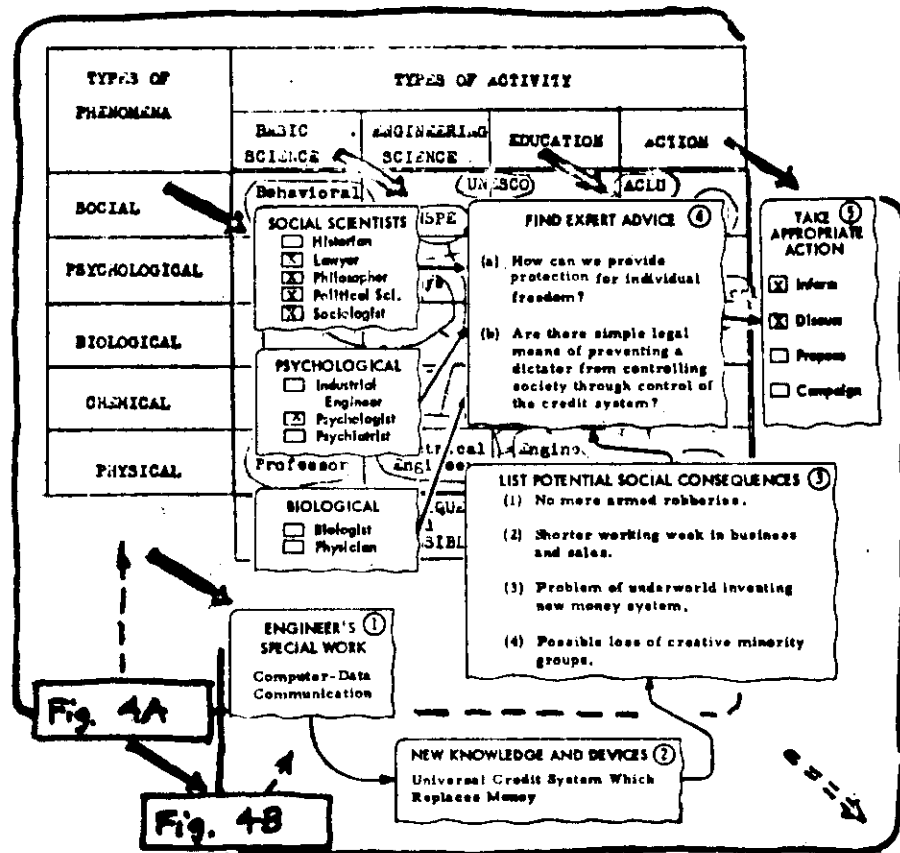
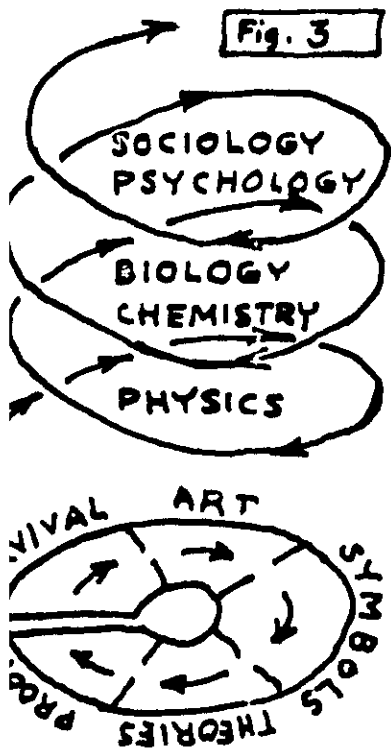


Fig. 2 - A Three-Dimensional Correlation Chart

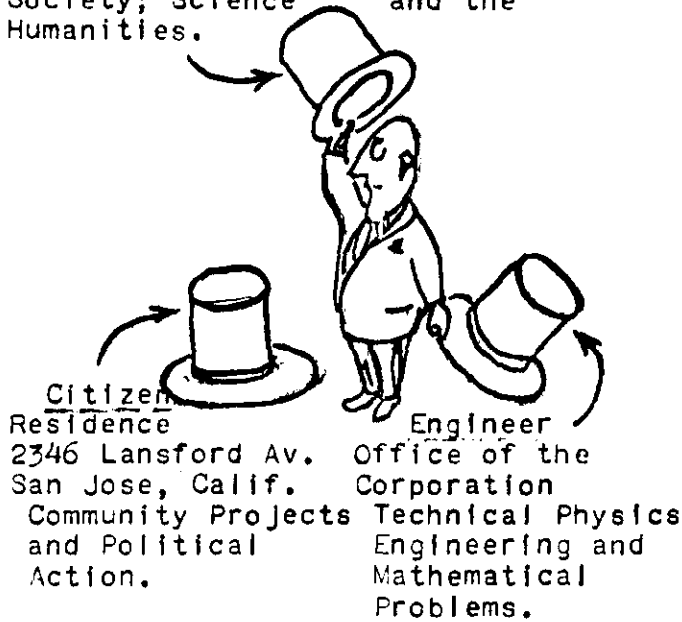
Using the chart of Fig. 2 helped me overlap information from a number of fields of science in a way that showed promise of leading to some multidisciplinary techniques which would make it easier for an individual to be socially responsible in a complex society. I also considered other methods of organizing information. Fig. 3 illustrates an alternative organization corresponding approximately to how scientific activities in society evolve. There is a kind of spiral development going from the physical sciences through the social sciences. On each level there appears to be a cycle of development going through the stages of SURVIVAL, ART, SYMBOLS, THEORIES, AND PROOF.

In 1958 I was invited to present a paper on the social responsibility of engineers at the Western Joint Computer Conference scheduled for San Francisco in March 1959. I first tried to make a simpler diagram for the engineering conference such as is shown by Fig. 4A in the form of a checking chart to aid engineers in maintaining a perspective of their work in respect to society. In the process of reviews of my proposed March 1959 paper during the period of August 1958 through February 1959 about five different versions of the proposed paper were prepared. The version which I finally presented in March 1959 at the conference was organized around the checking chart of Fig. 4B, which illustrated how an engineer in the computer industry could explore the social consequences of his work by identifying the potential social consequences, finding appropriate experts to advise on the problems, and then taking suitable action after working with the expert consultants.



Philosopher
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 Interaction between Engineering and
 Society; Science and the
 Humanities.

Fig. 5



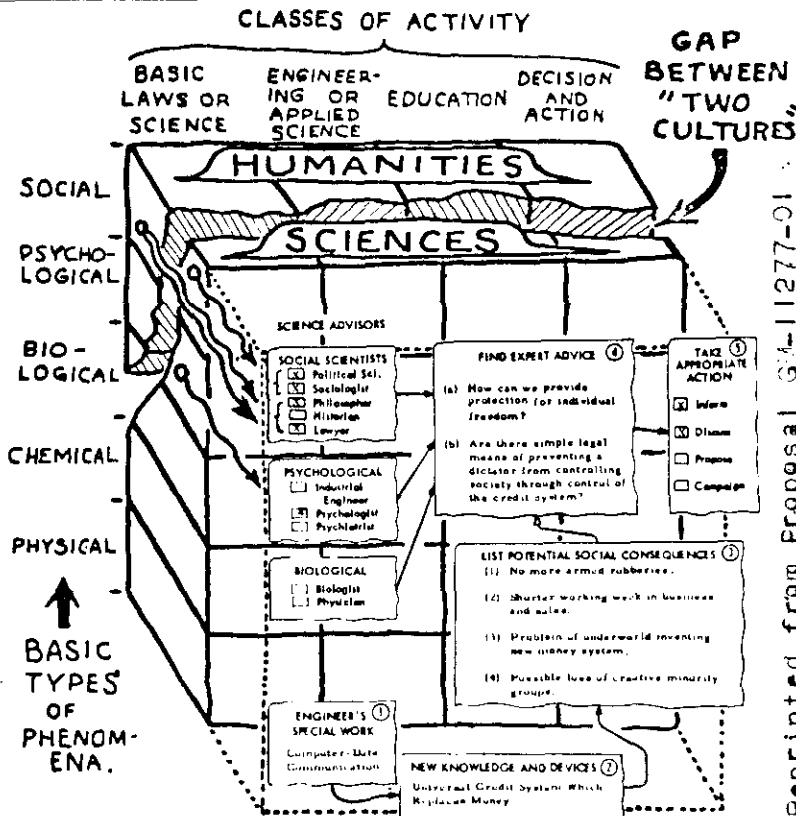
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An Engineer Changes Hats to Symbolize
 His Three Different Roles and His
 Attempt to Correctly Identify
 In What Role He Is at a Given
 Time.

My preparations for presenting the social responsibility paper at the 1959 Western Joint Computer Conference met with considerable opposition from the management of the corporation for which I worked. It was claimed that an engineer working for a corporation should not talk about social responsibility at an engineering society meeting. I was advised that the appropriate place for such discussion was a meeting of the Republican Party or the Democratic Party. However after much discussion I developed a plan for showing a slide at the beginning of my talk at the computer conference similar to Fig. 5 showing me putting on my "citizen's hat" before talking about "social responsibility."

From discussions following my paper on social responsibility it developed that problems of social responsibility of engineers could be more fruitfully discussed if more inter-disciplinary communication was established between engineers and other experts. Fig. 6 indicates how a chart evolved from earlier ones to illustrate the potentials of inter-disciplinary cooperation for exploring the social consequences of new engineering technology.



Reprinted from Proposal GM-11277-01 submitted to National Institute of Health, Bethesda, Md., October 31, 1962.

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Fig. 6 A Checking Chart Superimposed Upon A Classification System For The Sciences And The Humanities.

Actions by various levels of management in the corporation in which I worked made it difficult to maintain inter-disciplinary communication. In my 1959 computer conference paper I suggested that if corporation management was concerned that discussion of potential social consequences would cause leaks of proprietary information, then the corporation could hire social scientists to work within the corporation system to provide the expertise needed to test hypotheses on the social consequences of new technology.

Since my suggestions were met with unfriendly actions, I turned to develop multi-disciplinary analyses relevant to the interaction of engineering and sociological problems. By 'multidisciplinary,' I mean the analysis of multiple disciplines by one individual as is defined by the psychiatrist, Dr. William Gray (*Science*, 1964, 144, No. 3620, May 15). For this multidisciplinary analysis my perspective chart evolved further as is shown in Fig. 7, which I presented at the First International Congress of Social Psychiatry in London in August 1964.

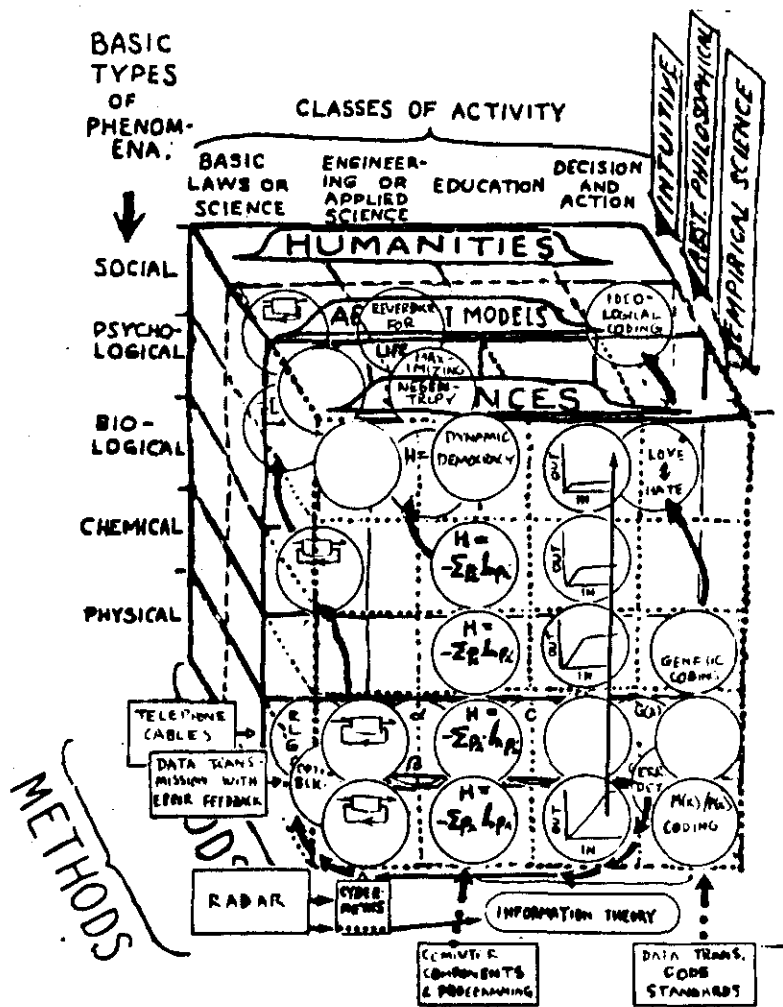


Fig. 7 Vertical Integration of Levels of Phenomena.

Reprinted from a Conference Preprint of a Paper Presented at The First International Congress of Social Psychiatry, London, August 17-22, 1964, Sectional Programme on General Systems Theory and the Multidimensional Character of Social Psychiatry.

"Toward A World Simulation," Simulation, Jan 1970.

A corporation-type organization is being formed within the framework of Simulation Councils, Inc., to implement the proposal for a world simulation. People were requested to send comments and constructive criticism to:

John McLeod, Task Force Manager, SCI World Simulation,
P.O. Box 2228, La Jolla, California 92037.

Simulation. A series of progress reports on World Simulation have appeared in various issues of this magazine.

"Toward A World Simulation," Computer*, Sept-Oct 1970. (*A publication of the IEEE Computer Group, now the Computer Society, publication formerly Computer Group News.) p. 49.

Summarizes the background, starting from McLeod's proposal in Simulation. A short description of the rationale. A status report of what has happened since the report in Simulation, Jan 1970: World Simulation Workshop II was held at Atlantic City, May 8, 1970. A Board of Trustees was elected. Since then, John McLeod has resigned from the Board to become Executive Director. Buckminster Fuller has been appointed to to the Board. A number of other experts from the computer industry and the social sciences have been added to the board.

SIMULATION IN THE SERVICE OF SOCIETY is the title of a new newsletter, announced in World Future Society Bulletin, March 1971, Vol. IV, No. 3, World Future Society Supplemental Program, P.O. Box 19285, Twentieth Street Station, Washington, D.C. 20036.

John McLeod is managing editor. The newsletter is dedicated to "all who are concerned about the current trend in world affairs, and to the improvement of the quality of life through improved understanding. It is intended to inform, stimulate, and hopefully to inspire those who are applying, or who in the future may be encouraged to apply, computer technology on behalf of humanity."

For a sample copy, write: SIMULATION IN THE SERVICE OF SOCIETY, P.O. Box 994, La Jolla, California 92037.

Nicholas Georgescu-Roegen, The Entropy Law and the Economic Process. Cambridge, Mass.: Harvard University Press(1971), \$16.00

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