

COMMUNICATION THEORY in the CAUSE of MAN

Notes on the application of General Systems Theory, Cybernetics, Information Theory, and related fields of Communication Theory to the strengthening of democratic institutions on our planet.

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TWO SETS OF PAGE NUMBERS:

Each page will be labeled with the volume and issue numbers of CTCM and with a "File Number." One may rearrange the pages of the cumulated issues by file numbers to put the sections in the order of the proposed book.

EDITORIAL NOTES:

This issue which was originally prepared in November 1970 was delayed until March 1971 by a number of problems. Since a primary aim of this magazine is to assist the youth of the world acquire the tools needed to bring the world closer to their ideals, it is important to provide space for feedback for what our youth have to say. As our son, Peter M. Wood added more appendices to his article, I bumped more other material to future issues. Then it took a long time to obtain permissions from authors and publishers for the quotations.

Next I reviewed the coherence of this issue as a unit and decided that some sections which were waiting for future issues were more relevant to the issues raised by Peter's article than some of the previously scheduled material. Some trading of sections was done between this issue and drafts of future issues in the file.

The next delays were caused by some important tests of new components of a computer-communication system at the corporation laboratory where I work. Some critical tests had to be done late at night and early in the morning in order to get enough computer time without interference from time-sharing features for the initial debugging work. This disrupted my normal evening and weekend schedule so that I had to set this issue of CTCM aside for a while.

The next delay was derived from a question raised by the personnel manager at the corporation laboratory where I work. He was concerned as to whether I have adequate protection against people mistakenly associating this magazine with the corporation. The weak link he pointed out was a letterhead I use in connection with carrying some of the business of running this magazine. A certain amount of time was used in reviewing the present and proposed alternate forms of letterheads in respect to the legal, ethical, and sociological problems involved.

POSSIBLE CHANGES IN THE OUTLINE FOR THIS SERIES:

To creatively respond to some of the material in our son's article in this issue, I may have to change my planned outline to include more material from sources outside the mathematical and scientific fields from which most of the projected material is derived. My wife, Elizabeth M. Wood, who teaches English in high school, brought an interesting book to my attention.

The advance or early developments in the split between the generations in our society are described in a novel by James A. Michener, Caravans, published in 1963 by Random House. Michener relates the fictional break with American upper middle class values in the case of a brilliant girl at Bryn Mawr in 1945. The girl goes to Afghanistan, marries a young Afghan, and deserts him after a while. Then she joins the caravan of a nomadic tribe that travels from Delhi to Kabul to the border of Tadjikistan and back each year.

Michener includes an account of how a Bryn Mawr music professor predicted back in 1945 a trend in American society that pointed to an increasing number of the younger generation breaking with the traditional values, yet not being successful in developing a viable new set of values. Reading Michener reminded me of what I heard in the Fall of 1945 in a sociology course I was auditing at Harvard. A distinguished sociology professor predicted a severe crisis in American society. At that time I wasn't sure how much to believe of what the sociology professor predicted. Over the years I gradually learned more about his data and hypotheses, and came to see his projections did have some significant validity.

When I tried to develop some practical application of the concepts available in academic sociology, I found that practical politicians had little interest in learning about the tools available to them from the social sciences, and that the social scientists weren't interested, because they wanted to preserve their neutrality.

In my search for ways to promote more interdisciplinary communication, I found that at a minimum I could develop an improved multidisciplinary understanding of some aspects of social systems by using the same concepts from Information Theory that I used in developing computer-communication systems. In the present instance, where expansion from the mathematical base I am accustomed to is indicated, I shall nevertheless stay close to Shannon and Weaver, The Mathematical Theory of Communication (Urbana, 1949) in developing such expansion.

Weaver in an appendix to Shannon's mathematical theorems, explained that there are three levels of communication theory:

- (1) The Technical level,
- (2) The Semantic level, and
- (3) The Effective level.

I find that I will have to include some material on the semantic level, instead of avoiding such words as noösphere. To initiate this step, I plan to start a glossary of terms in the near future. To include appropriate material on the effective level, I propose to examine how symbols were used in the church in the force era before many people could read or write to help maintain a value system in society. I just realized that there is a subtle similarity between the visual representations of the intellectual ideas in CTCM Vol. I, No. 4-X and the filmstrip issued by Cathedral Films on "The Lost Symbols" of the Church. I will go into more detail in a future issue of CTCM.

Frederick B. Wood

LETTER TO THE EDITOR: Worried About Spiral. (CTCM, Vol. I, No. 1-2, p. 12, reprinted on next page.)

San Jose, Calif.

Fred,

I respect your opinion and am intrigued by your application of cybernetics to social problems.

But I'm worried by your spiral, and curious as to your own idea to bring Charlie Bass and me to a closer practical path.

As you know, I am an exceedingly practical man and I hate seeing my arrow headed off in the wrong direction.

Are my ideas not fast enough because they need adjustment? Or because our problems may not be solvable? Or because the establishment is too close-minded to new approaches? Or what?

Jay B. Pendleton

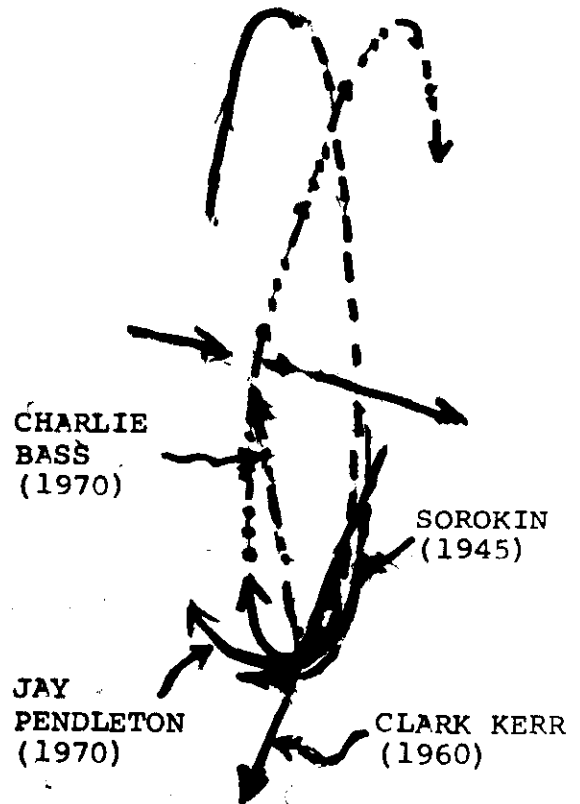
REPLY OF THE EDITOR: On the Spiral.

Arnold Toynbee(#) has shown that most civilizations when they hit the time of troubles like we are facing, go into a "universal state" (neo-fascist) and then slowly decline. The hypothesis of the spiral of evolution is that there is a potential path of development which could lead to our civilization evolving through these troubles to a more advanced stage, provided we are willing to organize the multidisciplinary and interdisciplinary research efforts required to learn sufficient detail about the path.

To test the validity of this spiral path, we must first examine the history of concepts of cycles and spirals in man's sociological development. The ancient Hindu philosophers developed a theory of cycles of development of human society. Although the Hindu cycles may fail to pass the scrutiny of modern science, it is important to examine this important stage of social theory. Yogi Paramahansa Yogananda describes the division of each 24,000-year cycle into an Ascending Arc and a Descending Arc of 12,000 years each, which are in turn each divided into four Yugas or Ages.(*). The four Yugas correspond to the Greek concepts of Iron, Bronze, Silver and Golden Ages.

Arnold J. Toynbee, A Study of History, Abridgement by D. C. Somervell of vols. i to vi as Volume 1, Oxford Univ. Press(1947); Abridgement of vols. vii to x as Volume 2, (1957).

* Paramahansa Yogananda, Autobiography of a Yogi, Los Angeles: Self-Realization Fellowship(tenth edition 1969), pp. 174-175.



The Current Spiral in Social Evolution.

Aristotle studied over a hundred city-states and developed a theory of the sequence of changes of type of government that were most likely to occur.(&) Pitirim Sorokin has reviewed studies of the fluctuations, rhythms and cycles of social processes in his 1928 book, Contemporary Sociological Theories.(¢) Sorokin also organized a study of how values and other characteristics of human civilization change over a 2500-year period.(%) Although Sorokin's studies seem to favor the cyclical, if you examine his work more carefully, you will find that he also collected and plotted data on the rate of inventions and scientific discoveries which tends to suggest a spiral form of social evolution. I have replotted his data in Fig. 1 in CTCM-File No. 121.

Bryan Bergson has developed a two-dimensional representation of biological-social evolution which he calls the theory of the socio-metabolic transition.(§) His development is based on biological evolution and upon a theory of psychological stress in human society. Books that are useful for understanding Bergson are Ideas of Biology by John Tyler Bonner(#) and The Stress of Life by Hans Selye.(@)

There are some useful concepts in regard to the nature of this spiral of social evolution in the studies of Karl Marx. For an example, I recommend reading a recent article by Bruce Gardner on Marxism and technology.(1)

Now I haven't given you a direct answer to your questions, but I feel that I have pointed the way toward seeking the answers. No major civilization has succeeded in passing this point on the spiral. If we study diligently these problems, our civilization may be the first to evolve to the next step, instead of collapsing and leaving it to some other culture to carry on the evolution of mankind. If we don't solve this problem, we may pass into the new fascist state discussed by Bertram Gross.(2)

Frederick B. Wood

& Aristotle, Ethics, BK VIII, CH 10.(Located by use of Syntopicon: Index in The Great Ideas - A Syntopicon of Great Books of the Western World. Chicago: William Benton, Publisher(Encyclopaedia Britannica, Inc.) Also included in Politics.

¢ Pitirim Sorokin, Contemporary Sociological Theories, N.Y.: Harper & Bros.(1928). pp. 728-741.

% Pitirim A. Sorokin, Society, Culture and Personality: Their Structure and Dynamics. N.Y.: Harper & Bros.(1947) A sample chart of "Growth and Decline of Main Systems of Law, Ethics, and Personality" in respect to the movement of deterministic and indeterministic philosophies, 580 B.C. to 1900 A.D. is reprinted in SEPR No. 211-B, page 11.

§ Bryan P. Bergson, "The Theory of Socio-Metabolic Transition," Pamphlet, September 21, 1969, 4pp., B. P. Bergson, 15000 Jeanette Lane, San Jose, Calif.95117.

John Tyler Bonner, Ideas of Biology, N.Y.: Harper & Row(1962)

@ Hans Selye, The Stress of Life, N.Y.: McGraw-Hill Book Co.(1956)

1 Bruce Gardner, "Marxism and Technology," California Engineer, Vol. 48, No. 2, January 1970, pp. 10-13, 16, 29, 31. (Office of Publication: Room 204, Eshleman Hall, Berkeley, Calif.94720)

2 Bertram M. Gross, "Friendly Fascism: A Model for America," Social Policy, Nov-Dec 1970.

LETTER TO THE EDITOR: Thermodynamic Imperative is Baloney.
(CTCM Vol. I, No. 1-2, pp. 23-28; Vol. I, No. 3-4, pp. 17-22)

San Jose, California
October 26, 1970

Dear Fred,

No matter how you slice Lindsay's Thermodynamic Imperative, it's still baloney. The purpose of minimizing entropy is to promote the efficient transfer of energy and information. There is no apparent connection between efficiency and happiness, however. Only the economic soothsayers would contend that an efficient society is a happy one.

If you will acknowledge that happiness takes precedence over efficiency, perhaps we can arrive at a mutually satisfactory agreement. Rather than using entropy as our criterion, why not try homeostasis? All biological processes utilize the principle of homeostasis as a basis. It is when this homeostatic balance is disrupted that the organism becomes unhappy. Society, being primarily biological, must also maintain a homeostatic balance. Moreover, a homeostatic balance must be maintained between man and his environment, inasmuch as man's environment is largely self-made. Here are the essential elements of the formula that you need. Put them together, show how they are related to entropic processes, and you will have a workable solution.

Sincerely,

Bryan Bergson

REPLY OF THE EDITOR: On Entropy and the Thermodynamic Imperative.

I do not agree with Bergson's criticism of the Thermodynamic Imperative. However I do agree that the term "entropy" is being overworked. We need some more specific definitions of entropy-like properties for each level of phenomena, such as the sixteen levels shown in the figure in CTCM-File No. 330, page 2. I think Professor Fano has made a start in this direction by defining the entropy-like property that is significant in respect to the study of the transfer of information as "Communication Entropy."

Dr. Alvin M. Weinberg reports that there was considerable discussion of "negentropy" at the Third International Conference on Science and Society, Herceg Novi, Yugoslavia (Bulletin of the Atomic Scientists, Nov 1969, pp. 23-26). He also uses the term "social entropy." Earlier use of the concept of "social entropy" can be found in Pitirim Sorokin, Contemporary Sociological Theories, N.Y.: Harper & Bros. (1928), p. 27. These references require further investigation to determine the validity of "social entropy."

On the question of happiness, I agree that happiness is as important as efficiency. However I would not let happiness take precedence to the extent that our social system collapses and disintegrates like ancient Rome. I do agree that the concept of homeostasis is more fundamental. However, I think that we can learn significant things about our social systems by defining entropy-like properties which can help us make steps toward solving our crucial social problems before we succeed in developing more detailed homeostatic models of the social systems.

As a base for future development of homeostatic models, I am including some elementary material on cybernetic feedback loops in this issue in CTCM-File No. 111. The elementary negative feedback loops are fundamental to understanding the more complicated feedback systems in biological and social homeostatic systems. Following the discussion of feedback, I am including some discussion of how the concept of entropy got to be introduced in the analysis of systems far afield from thermodynamics where entropy was originally defined.

I have included a blank chart for testing hypotheses in Section 2.5.1c at the end of this issue of CTCM. My intent is to fill in the blanks in due course of time as evidence accumulates for or against the hypotheses being considered in this series.

Frederick B. Wood

(a) Introduction.

If we review Section 1.1.0 on How Is Your Sociological Imagination, we are immediately confronted with the complexity of many of the problems facing our civilization. (CTCM I, 3-4, p. 5) If we trace a few questions on the chart(3-dimensional) in that section we find that the questions cross many levels of phenomena, cut across different methods(scientific, philosophical, humanistic), and require understanding of different stages of activity such as basic science, applied science, education, and decision(&action).

Now the philosophy of general systems theory is that we should be able to find similar structures, concepts, laws, etc., in different fields that would improve the chances of interdisciplinary communication between specialists in these different areas. Historically agencies such as the Tennessee Valley Authority made some important advances along these lines by bringing engineers, biologists, economists, regional planners, agricultural experts, chemists, etc., together to develop interdisciplinary communication on particular problems of the T.V.A. In aerospace research teams of specialists from many fields have had to cooperate in order to develop the techniques for space flight.

There is a fundamental block to the developing of interdisciplinary communication for the solution of sociological problems. The power structure of the establishment is afraid that the development of logical and scientific solutions to our sociological problems would increase the chances of the present leaders of the establishment losing power. Therefore there is little chance of any mass scientific attack on our sociological problems being financed on a scale comparable to space research.

The pioneers in basic sociological research have to have ways of earning a living outside of approved academic sociology. They have to have inherited a million dollars, or learned to farm in a way that only requires working six months a year, or they have to have some engineering or scientific skill that is important to the establishment so that they can work forty hours a week for the establishment and study the sociological problems on weekends.

For the 'weekend sociologists' to be succesful, they must find a way to major philosophical breakthroughs such as finding concepts that are functionally similar in three or four separate fields, so that they can understand the work of three or four specialists. Further the 'weekend sociologist' must have adjusted his work for pay for the establishment such that his work for pay overlaps in some way with the concepts needed in his weekend sociological research.

This set of conditions are not new to sociology. Fredrick Le Play, who collected the first major national statistics on social conditions of the workers in France was a mining engineer. He was able to do his sociological research during the six months of the year he was inspecting mines throughout France. Auguste Comte, the founder of academic sociology, was a professor of mathematics, and was confined to a mental hospital for a year during part of his attempt to establish sociology as a new field of science.

Lester Ward, the founder of American Sociology, was a biologist and worked in government bureaus in Washington, D.C. He became recognized officially as a sociologist at age sixty. Scott Nearing, as a young sociology professor tried to honestly attack important social problems, and was dismissed from his university position and eventually established a farming base for earning a living, such that he could spend six months a year on sociological research, writing, and lecturing. In the Soviet Union Joseph Stalin refused to believe Eugene Varga, the economist, who more accurately analyzed the stability of the American capitalist economic system.

The problems of present day sociology are discussed in a book review* by Jeffrey Schevitz, "Sociology Unmasked," a review of The Coming Crisis In Western Sociology, By Alvin W. Gouldner, Basic Books, \$12.50. Schevitz quotes Gouldner to the effect that Western Sociology has split into two sociologies: (1) Auguste Comte's "pure" sociology which became academic sociology or the university sociology of the middle class, and (2) Marxism, the party sociology of intellectuals oriented toward the proletariat.

It is my intuitive feeling that approaching sociological problems from an engineering viewpoint, where one looks for analogies that cross the boundaries between the physical sciences and the social sciences, will give mankind a deeper insight into sociological problems. I feel that this crisis in sociology about which Gouldner has written is capable of solution, if we think in terms of "complementarity" of wave and particle aspects in physics. (For definition see Van Nostrand's The International Dictionary of Applied Mathematics, Princeton(1960)).

The complementary aspects of how the ruling class runs a social system and what are the problems of the oppressed minorities are dealt with differently by the complementary theories of academic sociology and Marxism. Using another set of complementary aspects such as cybernetic feedback loops and communication entropy, we can expect to obtain a better perspective of the functioning of social systems, without being paralyzed by the hostility between supporters of academic sociology and Marxism.

To start our quest for a better understanding of social processes by use of communication theory, I shall give brief introductions to cybernetic feedback loops and to communication entropy.

(b) Cybernetics.

Cybernetics is defined as the science of communication and control in the organism and machine. It deals with the character and function of complex systems operation, including those that are self-organizing and adaptive.

The home heating furnace controlled by a thermostat is a simple example of one of the basic concepts of cybernetics --- namely the negative feedback circuit. The bimetallic thermal element of the thermostat measures the room temperature and provides negative feedback when the room temperature is too high (zero signal) and a signal to turn the gas back on when the room temperature gets too low.

* Ramparts Magazine, Dec 1970, pp. 56-63.

The control of a furnace by a thermostat is illustrated in Fig. 1 below. The response of the room temperature is shown as a function of time in fig. 2.

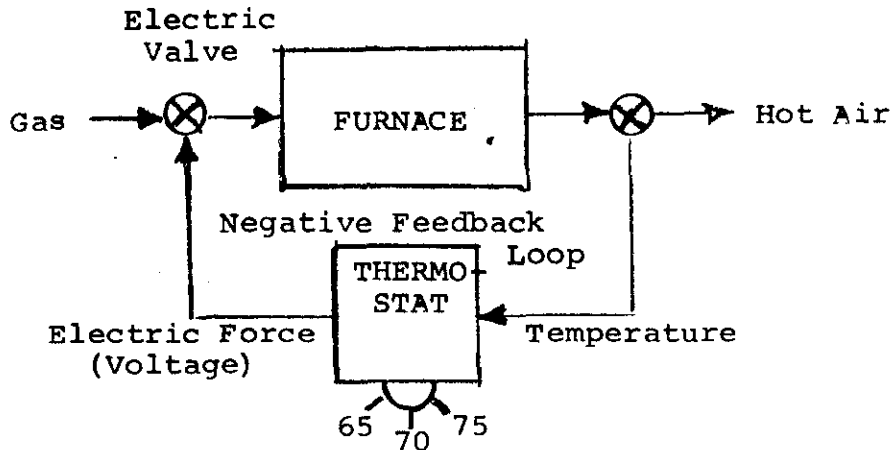


Fig. 1. Cybernetic Feedback Loop.

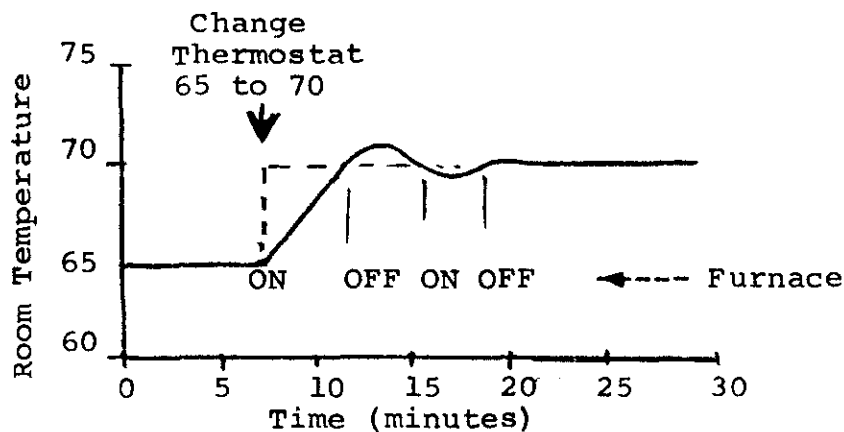


Fig. 2. Time Response of Room Temperature with Furnace Controlled by Thermostat.

There are mathematically similar feedback loops in automatic control systems in manufacturing plants, chemical plants, communication systems, and computing systems. Analogous feedback systems occur in nature --- in the complicated balance of the human glands, muscles, and the nervous system; in our psychological reactions; and in the interaction of groups of people in social and political systems. The further we go from physical and chemical systems into psychological and social systems, the less detail we know for sure, but the feedback concepts help us in our research. The more complex systems like the interindustry relationships in economics have so many potential feedback loops that it is impractical to show the detailed relationships by drawing in all the individual feedback loops,

but the relationships can be represented by mathematical matrices which can be processed by computers to give us important indicators of how our economy is functioning and what is significant for the market in specific sectors of the economy.

(c) Information Theory

In 1928 the famous astronomer, Sir A. S. Eddington grouped categories of scientifically measurable and non-measurable values.* Examples of the first class are distance, mass, and electric force; of the second class are beauty and melody. He then found that entropy, the physicists's measure of the extent of non-usable energy, seemed to fit partly in both classes, making "entropy" a potential link between humanistic values and empirical science with it measurable quantities. In 1929 the Hungarian physicist Leo Szilard pointed out more clearly the relationship between entropy and information.#

CATEGORY	CLASS	
	I	II
1) Distance	X	
2) Mass	X	
3) Electric Force	X	
4) Entropy	?	?
5) Beauty		X
6) Melody		X

Table I. Classification of Categories

Consider the categories in Table I, based upon the discussion of A. S. Eddington. The first three are obviously related by their common property of being physically measurable. Items 5 and 6 cannot be weighed or measured. There is something about beauty and melody which is not reduced to measurable units. These categories involve emotional feelings which are complex, yet they are more fundamental in human development. Does entropy belong in Class I or Class II?

* Sir A. S. Eddington, The Nature of the Physical World, First Edition. Cambridge: University Press(1928); Reprinted(1948), p. 105.

L. Szilard, "Uber die Entropieverminderung in einem Thermo-dynamischen System bei Eingriffen Intelligenter Wesen," Z. Physik, 53, 1929, p. 840. English trans. in Behavioral Science, October 1964.

Entropy is a measure of the ratio of disorder to order, a measure of something similar to beauty and melody, so it might belong in Class II. Yet at the same time, entropy in thermodynamics (the relationship between heat and mechanical work) is a measurable quantity defined by equations. Thus the concept of entropy becomes a potential link between the scientifically measurable and the emotionally beautiful.

The amount of information (but not the meaning of the messages) in an analysis of the messages sent over a telegraph line is equivalent to the concept of entropy in thermodynamics. The mathematical theory of communication (information theory) establishes a measure of the amount of information in a message based on the probability of the message being sent.

In information theory the negentropy (negative entropy) or communication entropy of a message of n symbols, each symbol having a probability P_n , is:

$$H = - (P_1 \log P_1 + P_2 \log P_2 + \dots + P_n \log P_n)$$

The condition for maximizing H for a fixed n , is that each of the symbols has an equal probability.

(d) Possible Relationship of Political and Religious Freedom with Maximizing Negentropy.

In 1945 the physicist, E. Schroedinger published a little book in which he discussed the relationship of biological systems to negative entropy.* Life processes represent local reversals of the degradation processes predicted by the second law of thermodynamics, but when the total system is analyzed the second law still holds. When one considers the nervous systems of a series of animals in the process of evolution, it appears that biological evolution can be related to increasing negative entropy, provided one defines everything very carefully.

If we take the formula for information or negentropy that was derived for telegraph message symbols and try applying it to a set of philosophies in a sociological system, we get some interesting results. Suppose we have n philosophical systems under consideration in a country. Substitute the probabilities that people believe in the different philosophical systems in place of the probabilities of occurrence of n symbols in the analysis of a telegraph system.

If there is no dominant philosophy, but everyone freely selects a philosophy and each philosophy turns out to have the same probability, then the negentropy of the social system in respect to philosophies would be: $-\log n$

* E. Schroedinger, What Is Life? Cambridge Univ. Press (1944). Reprinted, N.Y.: Doubleday Anchor (1956).

Suppose there are 100,000 people in a small city-state and that everyone has a separate philosophy, then the negentropy of the city-state in respect to philosophies is:

$$H = -\log_2 (1/100000) = \log_2 (100000) = 16.61$$

On the other hand, suppose the city-state is run by a dictator who requires every one to subscribe to one and only one official state philosophy. Even though it is probable that many people do not agree with the state philosophy, if we were to make a survey, they would probably give us poll results of 99.9% in favor of the state philosophy, because of fear of the enforcers on the dictators staff.

$$H = -(99900/100000) \log_2 0.999 - (100/100000) \log_2 0.001 =$$

$$= -(0.999)(-0.0014) - (0.001)(-9.9966) = 0.0014 + 0.0099 = 0.0113$$

These two examples give a negentropy of 16.61 for a completely free city-state where everyone has his own philosophy. In the one man controlled dictatorship the negentropy with respect to philosophy is only 0.0113 or practically zero. This tells us that the city-state with a negentropy of 16.61/philosophy is probably more democratic, we have no measure of whether it is strong enough to withstand enemy attacks. This sample calculation is too oversimplified to help us analyze a real social system. However, it does give us a first approximation to applying information to the study of social systems.

A second approximation has already been computed. A paper was presented at the 1963 Annual Convention of the A.A.A.S. in Cleveland in which a set of human freedoms relating to speech, religion, publication, sex, education, absence of job discrimination, home ownership, voting rights, trial by jury, and right to establish a small business or farm were treated like a set of telegraph messages such that the corresponding probabilities are substituted into the formula for negative entropy, the relative measure of democracy for six different hypothetical countries came out as follows:

Country A, Ideal Democracy	16.61	Country D, Oligarchy	6.31
Country B, Democracy	16.52	Country E, Caste System	3.25
Country C, Partial Democracy	13.89	Country F, Dictatorship	2.98

These calculations do not constitute a proof, but indicate that the hypothesis regarding the application of electrical communication theory equations to sociological systems can be tentatively used until contradictory examples are found. It is also necessary to know something about the other variables in the social system. To evaluate a sociological systems may require knowledge of about 15 other variables in addition to negentropy. For a tentative listing of these other variables see Section 3.3.0(CTCM Vol. I, No. 1-2, pp. 27-28)

PERSPECTIVE
by
Peter Mead Wood(*)

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* Manuscript received November 8, 1970

In my dream
I was one of the prison
with our heads against the wall
and we all
dreamt free of despair
in the strength of our common dream
Our dream
slipped through the bars
to seize our confiners
It carried them to solitary places
and staked them upon deserts of the heart
where all wardens and guards were our dependents
and they were tortured with themselves
in the knowledge of their living
and they dreamt vapors
which rose to mingle with this of ours
rising together to become nebulae
in the distance between sleeping stars
Thus we are left here
stripped of our dreams
watching each other across this space
wondering whose dream we are in now
and what we will all have to say when he awakes
for we know the acts of men
are the words of the ultimate dream called god
and there is no question of silence
only of clarity

by Tom Cuson,
San Francisco

PERSPECTIVE.....by Peter M. Wood

Introduction: The Split in Our Society

Many people are awakening and redefining their attitudes toward life.

"It's enough
to be alive
to see the sea
the sky and
watch the changes
to eat talk
joke and create
love feel
the air ground
sun yourself
and not
have to
be somebody(*)"

Many have experienced this new breadth of freedom through drugs. There is danger in this, not because drugs are something new(See Appendix A), but because of the mass scale and the repression of drug use (see Appendix B) widen the chasm between the drug culture and traditional society in this age of change.

Some become hedonists pursuing individual pleasure, which can range from having a good time to a spiritual experience. Most lead double lives: working some of the time and then changing, having beautiful lives in their spare time. This only compartmentalizes and emphasizes the split between business and science and the religious/aesthetic. It keeps transformations to a low, though fundamental, level. But what is needed is a synthesis of the two on all levels.

"Science may produce a civilization but not a culture.
Man's life under science alone stays sterile.....
Man's necessities include the spiritual life."(*)

Spiritual Truths

Let us begin with those who have had a spiritual experience. For some religion and philosophy become the center of their life. Their assumptions are much like the perennial philosophy of Huxley and the mystics(see Appendix C), which rests on two fundamental convictions:

"1. Though it may be to a great extent atrophied and exist only potentially in most men, men possess an organ or faculty which is capable of discerning spiritual truth, and, in its own spheres, this faculty is as much to be relied on as are other organs of sensation in theirs.

2. In order to be able to discern spiritual truth men must in their essential nature be spiritual; in order to know That which they call God, there must be some kinship between God and the human soul. Man is not a creature over against God. He participates in the divine life; he is, in a real sense, 'united' with God in his essential nature, for as the Flemish contemplative, the Blessed John Ruysbroeck, put it:

This union is within us of our naked nature and were this nature to be separated from God it would fall into nothingness."(#)

(For those who think they are separate from God, this nothingness is the feeling of anxiety, from which flows fear, the major obstacle to tackling most of our problems. See Appendix D)

A, B, C, D, etc. refer to appendices at end of article.

* Reprinted with permission from Architecture: Man In Possession of His Earth by Frank Lloyd Wright. N.Y.: Doubleday & Co.(1962) p. 11.
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In other words, man is able to discern spiritual truth and so must be, and is, a participant in the divinity. This personal faith applies to all men; Russian, Chinese, Indians, Arabs, Africans, and South Americans included. We are all following our own path to Nirvana, enlightenment, or perfect union with the All or God.

Values

From the perennial philosophy a value for people (and for all life) develops, and also a priority for people over property. And although one's first responsibility is to one's own spiritual development, some mystics believe their duty is also to help others along the path to enlightenment or holiness. (See Appendix D) Creating and maintaining an environment conducive to spiritual development is in the interest of the mystic. These are good reasons for some degree of social involvement.

Since most of us are on the path and have not achieved total union of thought, feeling, and action with, in and through God, we need an ethic to live by. The ethic can be humanism. But it needs to be coupled with scientific method, as in yoga, to ensure that we stay on the path. So we have a scientific humanism (Appendix E) --- Combining joy and love and spontaneity with method. From science we have the modified thermodynamic imperative (Appendix F). There is also the modern idea, and fact, of interdependency (an American Indian view). Despite our dominance, and perhaps because of it, maybe it would be beneficial for us to see ourselves primarily as the ancient Sumerians viewed themselves, as caretakers of the earth, not as its exploiters.

Problems

We are beset with problems: personal as well as political, social, economic, and military; stemming as much from our attitude toward our problems as from technological growth. The overriding problem facing us is survival--the threat of thermonuclear war. All our other efforts will be of little use unless we end the arms race.

The major personal problem is the existential one--what is the meaning of existence? Life is absurd, improbable; yet can be joyous, harmonious, spiritual--in a word, beautiful. The first parts of this paper suggest positive answers to this eternal question. We are here for no special reason--except to be and to procreate our kind.

The United States is the richest and most powerful nation on the Earth and yet we are not generous enough to ensure that all our citizens have adequate food, clothing, and shelter--not to mention the millions overseas whose nations' wealth we exploit.

We spend billions on defense (attack), on weapons designed to kill other human beings, which, although it supposedly stabilizes our economy, could be better spent restoring ecological balance, improving education, beautifying our environment, reducing social injustice, and ensuring government responsiveness to people's desires (a balance between social order and individual freedom).

Tools for Solution

We are in a time of rapid technological change, a transition from the Power Era to the Information Era.(*). Problems are aggravated; the individual seems to be lost in a wave of information and technology. Yet at this time of crisis, technology is supplying new tools: general systems theory, cybernetics, and computer technology. If these are used by men with humanitarian values, who infuse the spirit of these values into their work, and who perhaps have a caretaker of the earth self-image, there is hope, for we are still a society of men trying to live on this planet.

* For description of the transitions from the Force Era to the Power Era to the Information Era(or Communication or Cybernetic Era)see CTCM, Sections 1.2.1 and 2.1.2.

Appendix A: Continuity and Change

Man is constantly struggling with two conflicting drives: one for continuity, the other for change. Without change life becomes a bore. Throughout the years man has tried to alter or change his mental state through alcohol, the opiates, and various preparations of cannabis.

Hallucinogens are similar and yet quite different. They too have been around for several hundred years:

"In some primitive societies the plants from which the major hallucinogens are derived have been known for millenniums and have been utilized for divination, curing, communion with supernatural powers and meditation to improve self-understanding or social unity; they have also served such mundane purposes as allaying hunger and relieving discomfort or boredom."(#)

The Aztecs called mushrooms god's flesh.

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Appendix B: Note on Drug Use

The categorical repression of drug use by authorities does at least two things. It alienates some of our most creative youth at a time when all our human resources are needed to make the transition from the power to the information age; and it almost forces exposure of those who have found the various preparations of cannabis safe (less harmful than alcohol) to the dangerous, physically-addicting opiates.

Appendix C: The Perennial Philosophy

F. C. Happold has summarized the perennial philosophy as follows:

"This phenomenal world of matter and individual consciousness is only a partial reality and is the manifestation of a Divine Ground in which all partial realities have their being.

It is the nature of man that not only can he have knowledge of this Divine Ground by inference but also he can realize it by direct intuition....in which the knower is united in the known.

The nature of man is not a single but a dual one. He has not one but two selves, the phenomenal ego, of which he is chiefly conscious and which he tends to regard as his true self, and a non-phenomenal, eternal self, an inner man, the spirit, the spark of divinity within him, his true self. It is possible for a man, if he so desires and is prepared to make the necessary effort, to identify himself with his true self and so with the Divine Ground, which is of the same or like nature.

It is the chief end of man's earthly existence to discover and identify himself with his true self. By so doing, he will come to an intuitive knowledge of the Divine Ground and so apprehend Truth as it really is, and not as to our limited human perceptions it appears to be. Not only that, he will enter into a state of being which has been given different names; eternal life, salvation, enlightenment, etc."(*)

* Reprinted with permission from Mysticism by F. C. Happold. Harmondsworth, Middlesex, England: Penguin Books, Ltd.(1963), p. 20.

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Appendix D: Beyond Theology

"In the presence of holiness, there is always the feeling that moral rectitude is not only a caricature of holiness, but is in some way off the point. It's knows the words, but doesn't know the music.....

Holiness is close to but not quite the same as a return to innocence and to the life of spontaneous impulse.....
Holiness is the life of spontaneity and self-abandonment with humor..... Humor is the transformation of anxiety into laughter: the same trembling; but with a different meaning."
(*)

* Reprinted with permission from Beyond Theology by Alan Watts.
Cleveland, Ohio: World Publishing Co.(1966), p. 97.
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Appendix E: Values: Humanist and Scientific

<u>Humanist</u>	<u>Scientific</u>	
Freedom	Rationality	
Spontaneity	Moderation	
Creativity	Thoughtfulness	
Perceptiveness	Meliorism	'good'
Participation	Flexibility	
Sensory Awareness	Calculation	
Self-Actualization	Planning	
Joy and Love	Prudence	
Permissiveness	Abstraction	
Impulsiveness	Theory	
Anarchy	Rationalism	'bad'
Lawlessness	Indecision	
Chaos	Dehumanization	
Nihilism	Scientism	

From "The American Value System and the Manager of Change,"
Seminar Paper by Frederick Bruce Wood, course MS262, George
Washington University, May 18, 1970, p. 26(fig. five)

Appendix F: The Thermodynamic Imperative

(a) The Lindsay Thermodynamic Imperative

"All men should fight always as vigorously as possible to increase the degree of order in their environment, i.e., consume as much entropy as possible, in order to combat the natural tendency for entropy to increase, and for order in the universe to be transformed into disorder, in accordance with the second law of thermodynamics."(*)

* Thematic hypothesis from The Role of Science in Civilization by B. B. Lindsay. New York: Harper & Row, Publishers(1963) p. 292. Reprinted in The Social Impact of Cybernetics by Charles R. Dechert. University of Notre Dame Press(1966) pp. 189-190.

(b) Wood's Modified Thermodynamic Imperative

"All men should fight always as vigorously as possible to optimize the order-diversity balance in their environment, i.e., consume as much entropy as possible, in order to combat the natural tendency for entropy to increase and for order in the universe to be transformed into disorder, and diversity to be transformed into conformity, in accordance with the second law of thermodynamics."(#)

From "An Example of the Modified Thermodynamic Imperative" by Frederick Bernard Wood in CTCM Section 2.3.2C, (File No. 232-F-8, p. 5) Vol. I, No. 3-4.

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Section 2.5.1c: Chart for Testing Hypotheses Relevant to the Communication Era.

TABLE : BLANK CHART FOR TESTING SOCIAL HYPOTHESES

LOGICAL TESTS & EXPERIMENTS	DEDUCTIVE	INDUCTIVE				EMPIRICAL & EXPERIMENTAL TESTS										GROUP								
		Physical	Chemical	Biological	Psychological	Sociological	Hindu Social Cycles	Aristotle's Gov Stages	Sorokin's Social Cycles	Tombee's Civlitz. Cycles	Library Shelves	Bulletin Boards	Meeting Space	Radio & TV Time	Computing Power		Measures of Democracy	Monitor Econ Developmt	Eval Military Policies	Population Gwth Cntrl	Disarmament Conditions	Political Ideology	Ethics Coordinating Principle	Capability of Democratic Control
THEORIES	1																							
	2																							
	3																							
	4																							
	5																							
	6																							
	7																							
	8																							
	9																							
	10																							
MODIFIED																								
WORLD LAW THRU COMMUNICTN																								
PACIFIST ETHICAL ACTION																								
THERMODYNAMIC IMPERATIVE:																								
WITH DISCRETE CHAN MODEL																								
WITH CONTINUOUS CHN MDL																								
WITH CYBERNETIC FDBK LPS																								
WITH FUZZY SETS																								
MINIMAX NEGENTROPY ALLOCTN																								
SOCIO-METABOLIC TRANSITION																								
EPICOSM MODELS																								

a b c d e f g h i j k l m n o p q r s t u v w x y

The plan is to fill in numbers referencing notes on how the hypothesis (row) meets the tests (columns) such that when completed, this table will give us a view of how these hypotheses meet the tests for validity in a manner similar to the test of the special theory of relativity in physics. (See Section 2.1.4)

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