

A Working Paper Draft

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SOCIO-ENGINEERING PROBLEMS. No.64

A series of manuscripts on the social relations of engineering and related philosophical questions dealing with the interaction of science and society. Distribution is limited to reviewers and discussion groups for criticism prior to consideration for possible publication.

THOUGHTS ON THE RELATIONSHIP BETWEEN:

- (1) ENGINEERING SCIENCE & MATHEMATICS,
- (2) SOCIAL SCIENCE, AND
- (3) POLITICAL & RELIGIOUS GROUPS.

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Introduction

During my recent vacation I found that many deep philosophical problems came to the surface. From my trip report* which I wrote before leaving on vacation, one can deduce that I met people who were interested in serious philosophical discussions.

These experiences have led me to review a question that has occurred to me a number of times before. Would I be able to contribute more significantly to the protection and growth of our democratic countries by leaving engineering to become a sociologist?

Engineering or Sociology?

A few engineers and physical scientists have made the transfer to other fields such as sociology, political science, economics, philosophy, and social welfare. From a study of the development of sociology, I fully understand Professor Sorokin's statement that sometimes society does not permit a scientific study to be made of itself. The founder of Sociology in France was dismissed from his job at the Ecole Polytechnic; and the founder of Sociology in the United States did his major sociological work as a hobby while earning his living at other jobs. Many present day sociologists in America have avoided research on the most important problems to avoid

* Report of trip to Paris, Nice and Stockholm of July 19, 1961 to August 3, 1961 on engineering work connected with code standardization for computer communication systems.

the possibility of losing their jobs. This failure to attack the basic problems weakens the position of the democratic countries in the present day international conflicts.

My conclusion is that it is not advisable to transfer to sociology. The practical thing to do is to remain active in engineering, particularly in areas that involve cybernetics and information theory which are rich in potential analogies useful in the social sciences. The enclosed Figure 1 illustrates some of the potentialities. In this short report, I shall not take time to give details. However indications of these possibilities are contained in some of the references listed.

Authoritarian Societies and Specialization

I feel that one of the contributing factors to the rise of fascism in Germany and Italy after World War I was the growing specialization of science and engineering and other professions which unconsciously promoted irresponsibility. I feel that we must vigorously try out any unifying principle or technique which might help communication between fields of professional specialization.

Earlier Definition of Engineering (1942)

The Engineers Council for Professional Development many years ago defined the engineer as:

- (1) an interpreter of science in terms of human needs, and
- (2) a manager of men, money, and materials in satisfying these needs.

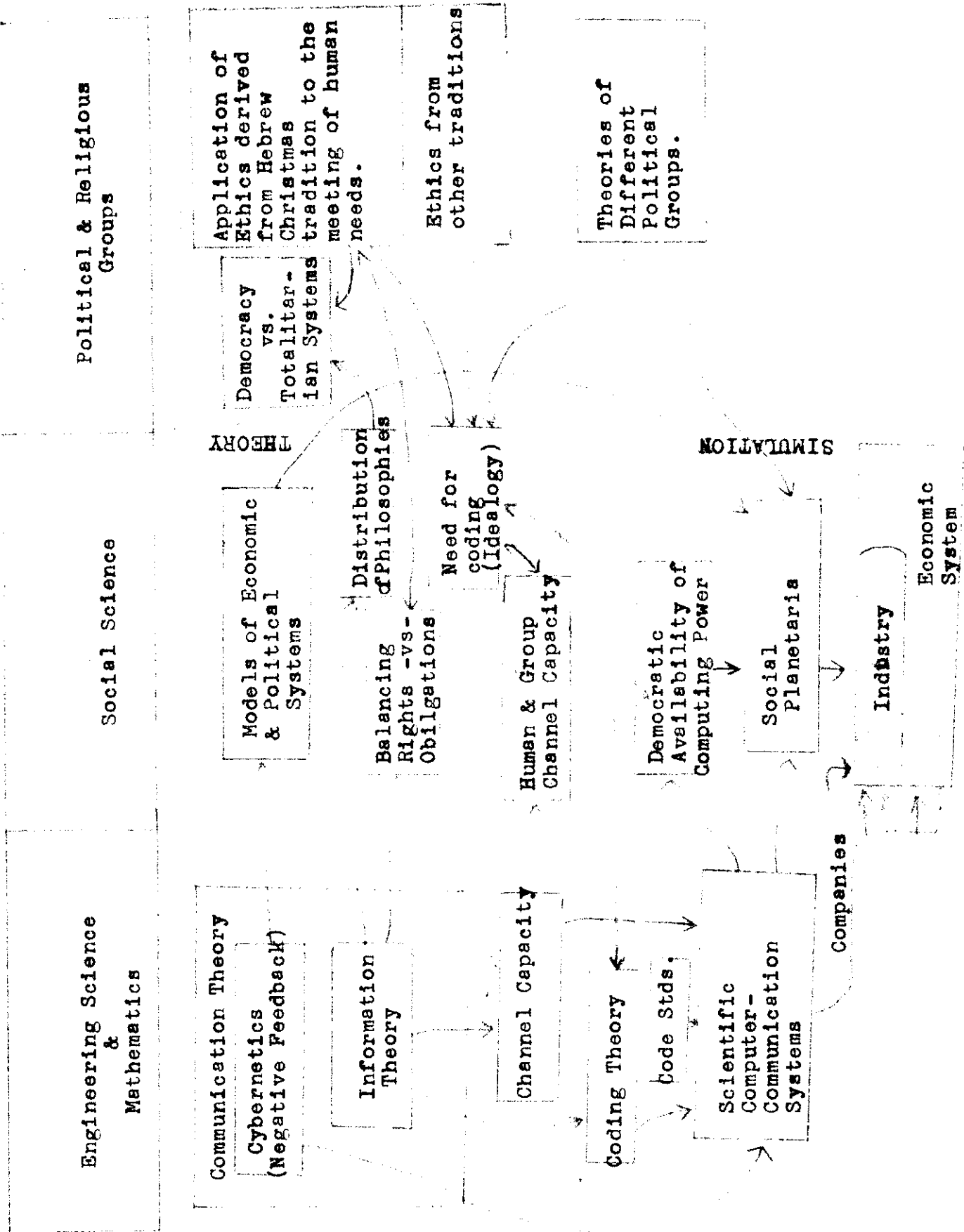


Fig. 1 The Social Use of Communication Theory

Although they were probably only thinking of private and collective property, it is instructive to ask what are human needs? The French mathematician and writer, Simone Weil, who was on General Charles De Gaulle's staff in exile in England during the early part of World War II, listed human needs as follows in her book, The Need For Roots:

Order	Freedom of Opinion
Liberty	Security
Obedience	Risk
Responsibility	Private Property
Equality	Collective Property
Hierarchism	Truth
Honor	ROOTS
Punishment	

Perhaps another should be added to the list, namely "Love."

Human Needs and Engineering During World War II.

During World War II many of the above human needs appeared consciously and verbally in the organizing and carrying out of various engineering projects I was on. In fact the visualization of the social needs and consequences of our engineering work helped us engineers speed up our projects and use our creative abilities to the fullest to accomplish our objectives in fighting for freedom and democracy.

Communication between Engineers and Political & Religious Leaders

In a paper on the social responsibility of engineers I have shown a way to restore consideration of two of the above human needs to consideration in engineering work, namely responsibility and freedom of opinion. Most of the above

human needs are presupposed to be taken care of by the institutions of church and state. I do not believe that church leaders and statesmen comprehend the technological changes well enough to propose needs under new conditions. There must be constructive communication between engineers (and scientists), and political and religious leaders.

The diagram of Figure 1 also indicates possible inclusion of consideration of the human needs of: order, liberty, risk, and truth; and possibly a clearer understanding of the use and control of private and collective property. The potential contribution to the human need of Roots is indirect through reducing the over-specialization through promoting the use of common concepts in related fields. This should also reduce the "alienation" discussed by Pappenheim.

I am not claiming any new analogies of cybernetics or information theory, but am pointing out the need for some engineering type translation of these ideas proposed by Wiener, Weaver, Rothstein and others to a form such that a church or political group wishing to promote better world understanding can use the ideas constructively. This role might be to Sociology as Engineering is to Physics.

Communication and Creativity

There appears to be some positive feedback which increases the technical output of engineers who successfully maintain communication with the social scientists, political leaders and

religious leaders, provided conditions are not destroyed by the forces toward various specialization. The relationship to creativity is discussed in another note.*

Military Electronics, Religion, and Guilt

Another related problem is the feeling of guilt that some people in the military electronics business have who cannot reconcile their religious convictions for world peace with the manufacture of weapons. If there were peace projects available which used concepts common to some phase of the military electronics work such people were doing, there might result a development of great value to both the individuals and society. A possible first link in this direction would be a review of the accomplishments so far in the application of information theory to biology and psychology.

Outline of Proposed Book

An outline of a proposed book on "Frontier Problems of Engineering Sociology" is being written¹ to indicate the kind of a project that could be developed along these lines.

*See SEP No. 66

¹See SEP No. 65-C (10/10/62) Proposed Research Plan on "Communication Theory in the Cause of Man."

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