

4S Society for Social Studies of Science

Summer 1981

Volume 6 Number 3

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4S Society for Social Studies of Science

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Society for Social Studies of Science
SIXTH ANNUAL MEETING

Program

THURSDAY, NOVEMBER 5, 1981

9:00 a.m.-4:00 p.m.

REGISTRATION-Main Lobby

10:30 a.m.-12 noon

COUNCIL MEETING-Treaty Room

1:00 p.m.-1:30 p.m.

WELCOME-Independence A

Bernard Barber, President 4S

Henry C. Bourne, Vice President, Academic Affairs, Georgia Tech

1:30 p.m.-4:00 p.m.

SESSION 1 - ORGANIZATIONAL SETTINGS-Independence B

Simon Marcson, Chair--Rutgers University

Public Policy for Industry-University Cooperation in R&D

Barry Bozeman, The Maxwell School, Syracuse University and

Ken Ruscio, U.S. General Accounting Office

Facing the Future at the National Bureau of Standards

Joseph F. Coates, JF Coates Inc., Washington, DC

State Funding Agencies, Alternatives and Scientific Change

Katrin Fridjonsdottir, Sociology, University of Lund, Sweden

Information Flow through Strong and Weak Ties in Intraorganizational
Social Networks

Noah E. Friedkin, Education, University of California, Santa Barbara

SESSION 2 - PUBLIC KNOWLEDGE AND PARTICIPATION IN TECHNICAL DECISION-MAKING
-Independence C

James Petersen, Chair--Western Michigan University

The Impact of Public Involvement in Biomedical Policy: Evidence from
Four Case Studies

Diana Dutton, Family, Community and Preventive Medicine, Stanford
University School of Medicine

Epidemiology and Government Health Regulations

Viviane Thevenin, History of Science, Johns Hopkins University

Engineering and Architecture: Issues in Self-Regulation of the Professions

Hedvah Schuchman, Center for Technology Assessment, NJ Institute of Technology

Technical Nuclear Knowledge and Attitudes toward Nuclear Power Before and
After TMI

John H. Reed, Energy Division, Oak Ridge National Laboratory and

John M. Wilkes, Social Science and Policy Studies, Worcester Polytechnic
Institute

Arie Rip, University of Leiden, The Netherlands-Discussant

THURSDAY, NOVEMBER 5, 1981 (Cont'd)

7:30 p.m.-9:30 p.m.

PLENARY. Micro- vs. Macrosociology of Knowledge-Independence C

Karin D. Knorr, Organizer--Virginia Polytechnic Institute

Michael Mulkay, Chair--University of York, England

Panel: H.M. Collins, Humanities and Social Sciences, University of Bath
Thomas F. Gieryn, Sociology, Indiana University
Karin D. Knorr, Center for the Study of Science in Society, VPI
Steve Woolgar, Sociology, Brunel University, England

9:30 p.m.-11:30 p.m.

COCKTAIL PARTY-Assembly C

Sponsored by the Georgia Tech Foundation

FRIDAY, NOVEMBER 6, 1981

8:00 a.m.-10:30 a.m.

REGISTRATION-Main Lobby

SESSION 3 - INSTRUMENTATION FOR RESEARCH (Breakfast Session)-Assembly B

Howard Gobstein, Chair and Discussant--U.S.GAO

Indicators of Scientific Research Instrumentation in Academic Institutions:
A Feasibility Study

Gerard Glaser, Government Studies Group/SRS, NSF

Titles TBA:

Carl Gralton, Auburn University and U.S.GAO

Martin Rubin, Clinical Chemistry, Georgetown University Hospital

Thomas Stelson, Research Vice President, Georgia Tech

SESSION 4 - HISTORICAL STUDIES OF SCIENCE (Breakfast Session)-Assembly D

Arnold Thackray, Chair--History and Sociology of Science, University of
Pennsylvania

Exporting the Land-Grant Model: The Rockefeller Foundation in Mexico, 1943-53
Deborah Fitzgerald, History and Sociology of Science, University of Pennsylvania

Analysis of Experimental Research on Poliomyelitis, Measles, and Yellow Fever,
1909-1960

Rene I. Jahiel, New York University Medical Center

De Tocqueville's Democracy in America: A Sociology of Science Analysis
Eileen L. McDonagh, Political Science, Northeastern University

Social Responsibility in 19th Century Science

John Ziman, Wills Physics Laboratory, University of Bristol, England

Sal P. Restivo, Anthropology and Sociology, Rensselaer Polytechnic Institute
-Discussant

10:00 a.m.-10:30 a.m.

COFFEE BREAK-Assembly C

10:30 a.m.-12:30 p.m.

SESSION 5 - Social Contexts of Scientific Discourse-Assembly B

Henry Small, Chair--Institute for Scientific Information, Philadelphia

FRIDAY, NOVEMBER 6, 1981 (Cont'd)

Forces and Choices Shaping a Scientific Paper: Arthur H. Compton, Physicist
as Writer of Non-Fiction

Charles Bazerman, English, Baruch College, City University of New York

Life History of a Knowledge Claim: The Opiate Receptor Case

Susan E. Cozzens, Institute for Scientific Information

Experiments Are the Key: A Preliminary Analysis of Scientific History Making

Nigel Gilbert, Sociology, University of Surrey, England and

Michael Mulkay, Sociology, University of York, England

Temporal Order in Laboratory Work

Michael Lynch, Sociology, University of California-Los Angeles

Paper Forms and Groups

Nicholas C. Mullins, Sociology, Indiana University

SESSION 6 - SCIENCE AND TECHNOLOGY IN INTERNATIONAL PERSPECTIVE-Assembly D

Alex Michalos, Chair--College of Guelph, Ontario

Assessing Programmatic Efforts by the U.N. System to Foster the Development
of Indigenous Scientific and Technological Capacity in Developing Countries

Gerald A. Cole, Institute for Social Research, University of Michigan

LDC Demands for Science and Technology

J. Davidson Frame, Management Science, George Washington University

Chinese Science and the Cultural Revolution: A Re-Interpretation

Maurice N. Richter, Jr., Sociology, State University of New York-Albany

Scientific Immigrants in Venezuela: Ethnicity, Nation, and International Science

Hebe M.C. Vessuri, Center of Development Studies, Central University of Venezuela

Science Policy and the Developing Societies--A Case Study of the Indian Experience

Dhirendra Sharma, Centre for Studies in Science Policy, Jawaharlal Nehru
University, India

Burkhart Holzner, Center for International Studies, University of Pittsburgh

-Discussant

12:30 p.m.-3:00 p.m.

Luncheon/45 Business Meeting-Independence A & B

(Luncheon to be followed by presentation of the John Desmond Bernal Award
for Distinguished Contributions to the Social Studies of Science)

3:00 p.m.-5:00 p.m.

SESSION 7 - BIBLIOMETRIC STUDIES OF SCIENCE-Assembly B

Belver C. Griffith, Chair--Library and Information Science, Drexel University

Continuities in Bibliometric Analysis: The Case of an Interdisciplinary Social
Science Field

Alan Bayer, Florida State University and The Boys Town Center for Youth
Development, Omaha

A New Method for the Mapping of Science and Technology: The Analysis of
"Co-Words" in Specialist Publications

Michel Callon, Ecole Nationale Supérieure des Mines de Paris, Centre de
Sociologie de l'Innovation

FRIDAY, NOVEMBER 6, 1981 (Cont'd)

J.P. Courtial, Ecole Nationale Supérieure des Mines de Paris, Centre de
Sociologie de l'Innovation

W. Turner, Université Louis Pasteur, GERSULP, Strasbourg

Measuring the Quality of Papers and the Dynamics of Fields
James MacAulay, Science Council of Canada

Structural Characteristics and Citation Rates of Education Journals
John Smart, Graduate School, Virginia Polytechnic Institute and State University
Charles Elton, Higher Education, University of Kentucky
Steve Cohn, Sociology, University of Maine-Discussant

3:00 p.m.-5:00 p.m.

SESSION 8 - SPECULATION AND THE PROCESS OF DISCOVERY-Assembly D
(Co-sponsored by the Social Psychology of Science Subgroup)
John Wilkes, Chair--Worcester Polytechnic Institute

Serendipity or Discovery by Intention?

John Ziman, Wills Physics Laboratory, University of Bristol, England

Science as the "Litigious Lady": On the Psychology of Scientific Discovery
Sonja Grover, Educational Psychology, University of Calgary, Alberta

The Hawthorne Effect: A Reinterpretation of the Methodological Artifact
John Adair, Psychology, University of Manitoba, Winnipeg

The Hawthorne Studies: Their "Effect" on Human Research
Richard Franke, Worcester Polytechnic Institute

Socialization of Scientists: Internalization of a Myth
Larissa Lomnitz, Universidad Nacional Autónoma de México and
Jacqueline Fortes, Universidad Nacional Autónoma de México
Ron Westrum, Sociology, Eastern Michigan University -Discussant

5:00 p.m.-6:00 p.m.

SOCIAL PSYCHOLOGY OF SCIENCE SUBGROUP BUSINESS MEETING-Assembly D

8:00 p.m.-11:00 p.m.

PLENARY - Epistemologically Relevant Internalist Sociology of Science: A
Report and Discussion on the Cazenovia Conference

Donald Campbell, Organizer and Chair--The Maxwell School, Syracuse University

Panel: Alex Rosenberg, Philosophy, Syracuse University
Thomas Gamble, Psychology, Syracuse University
Thomas Nickles, Philosophy, University of Nevada, Reno
Sal Restivo, Anthropology and Sociology, RPI
Thomas Gieryn, Sociology, Indiana University - Discussant
Karin Knorr, VPI -Discussant

SATURDAY, NOVEMBER 7, 1981

8:00 a.m.-10:00 a.m.

SESSION 9 - Social Studies of Technology (Breakfast Session)-Assembly B
Jerry Gaston, Chair--Sociology, Texas A&M University

SATURDAY, NOVEMBER 7, 1981 (Cont'd)

The University in the Age of Technology
Joe Agassi, Philosophy, Boston University

Perceptions of Technological Risks
Gerald Cole, Institute for Social Research, University of Michigan

Toward an SST: Social Studies of Technology
Ron Johnston, History and Philosophy of Science, University of Wollongang, NSW

Systematic Categorization of Human Goals as a Tool in Social Studies of Technology
D.J. Montgomery, College of Engineering and College of Natural Science,
Michigan State University
Stanley R. Carpenter, Social Sciences, Georgia Tech - *Discussant*
Ron Westrum, Sociology, Eastern Michigan University - *Discussant*

SESSION 10 - Politics and the Social Sciences (Breakfast Session)-Assembly D
A.H. Teich, Co-Organizer and Chair--AAAS

Social Science and the Politics of Science: The 1940's
Roberta Balstad Miller, Social Science Research Council

Social Science and the Politics of Plenty: The 1960's
James D. Carroll, The Maxwell School, Syracuse University
John Holmfeld, House Committee on Science and Technology - *Discussant*

10:00 a.m.-10:30 a.m.

Coffee Break-Assembly C

10:30 p.m.-12:30 p.m.

SESSION 11 - Explaining Science: Practical Reasoning and Rhetoric-Assembly B
Nico Stehr, Chair--Sociology, University of Alberta, Canada

The Rejection of Parapsychology Research Results
Peter A. Koefoed, Netherlands Universities' Joint Social Research Centre(SISWO) and
William A. Verloren van Themaat, SISWO

Scientific Jokes Should Not Be Laughed At: Some Recommendations Concerning the
Analysis of Scientific Culture
Michael Mulkay, Sociology, University of York, England and
G. Nigel Gilbert, Sociology, University of Surrey, England

Kuhn--The Conservative and Radical Interpretations: Are Some Mertonians
"Kuhnians" and Some "Kuhnians" Mertonians?
Trevor Pinch, School of Humanities and Social Sciences, University of Bath,
England
Steve Turner, Sociology, University of South Florida - *Discussant*

SESSION 12 - The Diffusion of Knowledge in Nineteenth Century Britain-Assembly D
John Sevier, Organizer--Sociology, Indiana University-South Bend
Arnold Thackray, Chair--University of Pennsylvania

Who Gets What Published? The Role of Publishers' Readers
Linda Marie Fritschner, Indiana University-South Bend

Robert Chambers' Vision of Science: Chambers' Edinburgh Journal, 1832-1859
Gov Hutchinson, Agnes Irwin School

British Examples and Colonial Imitations: Natural History Museums, 1870-1900
Susan Sheets-Pyenson, Centre for Interdisciplinary Studies, Concordia University,
Montreal

The Rise and Fall of Popular Science in Nineteenth Century Britain
John Sevier, Indiana University-South Bend
Frank Turner, History, Yale University, *Discussant*

ABSTRACTS OF PRESENTATIONS--SIXTH ANNUAL MEETING (PUBLISHED ALPHABETICALLY)

Continuities in Bibliometric Analysis: The Case of an
Interdisciplinary Social Science Field

Alan Bayer

Selected quantifiable characteristics of articles appearing in the primary journal of the interdisciplinary area of marriage and family studies are analyzed. Consistent with studies of other science fields, several of these characteristics are shown to be substantially related to subsequent impact in the field as determined through citation frequency. The results provide further evidence of the Matthew Effect and the operation of the "invisible college." Articles are more frequently cited when they are written by the more eminent scholars in the field, and when they are explicitly linked to prior literature in the field, to contemporary theoretical focus, and to more current ongoing research not yet published. However, contrary to other fields, collaborative work in the area does not yield higher visibility of the scholarly products.

Forces and Choices Shaping a Scientific Paper: Arthur H. Compton,
Physicist as Writer

Charles Bazerman

An understanding of the forces and choices that determine what appears on a page of a scientific article reveals both the social embedding and the specialized originality of the scientific text. The rhetorical situation of a discipline and a narrower problem area provide the linguistic tools and establish constraints on problem formulation and mode of argument, but the possibilities of the rhetorical situation can only be realized through the shaping choices made by the individual scientist (or team of scientists) at the levels of research program, experimental design, and writing of the report. The final text bears the imprints and makes representations of all the stages of its development, but the earlier choices and forces have so shaped the text that they do not present themselves as matters for conscious decision during the actual writing up. Of more immediate concern during writing and revision are the accurate and precise

representation of the later choices of hypothesis and experiment. Moreover, the reports of experiments are constrained by the limitations of experimental equipment and the results obtained.

An examination of the writings of Arthur H. Compton surrounding the announcement of what later was called the Compton Effect reveals such a pattern of shaping constraints and realising choices. Compton's notebooks reveal in the case of the article "Measurement of β -rays Associated with Scattered X-rays" that Compton in draft and revisions showed most concern with accurate, precise and extensive accounts of experimental procedures, results and hypothesized theory. Some attention to felicity of language and representation of authorial persona suggests limited persuasive concerns best understood in relation to the prior constraints. The process of revision through manipulation of language, find adjustment of statements, structural expansions and changes, and changes in graphic features helps turn the text itself into an object to be consciously controlled as a realization and representation of the earlier constraints and choices.

Public Policies for Industry-University Cooperation in R&D

Barry Bozeman, The Maxwell School, Syracuse University
Ken Ruscio, U. S. General Accounting Office

University-industry cooperation, most agree, can improve the nation's research and development. Not only would it facilitate the transfer of knowledge from the primary performers of basic research to the primary performers of applied research and development, but it would also strengthen the universities' financial condition and the industries' innovative capacity.

Because of these benefits, university-industry cooperation has recently become a significant public policy question. The Stevenson-Wydler Act of 1980 established an Office of Industrial Technology and Centers of Industrial Technology at universities. Also, the Shannon Bill (HR 1864) and the Bradley Bill (S 692), its Senate counterpart, provide for a 25% tax credit for the amount which firms invest in university R & D. The tax approach fundamentally differs from the programmatic approach which requires a far more direct government role. The first object of this paper will be to compare these two approaches by constructing a model of policy based on the extent to which government becomes directly involved.

The second object of the paper will be to determine the likely response of industries to these legislative efforts. Through the use of original data and existing research, we discuss industries' criteria for investment in university R & D. Also, we look at their method for deciding to conduct research at universities. Based on the model previously developed, judgments will be made about the implementation of current and proposed government policies.

On one level, the paper introduces a model for assessing policy in terms of the directness or indirectness of the government role. On another level, it will provide basic information about one aspect of industrial R & D and government policy.

A New Method for the Mapping of Science and Technology: The
Analysis of "Co-Words" in Specialist Publications

Michel Callon, Ecole des Mines, Paris
J. P. Courtial, Ecole des Mines, Paris
W. Turner, GERSULP, Strasbourg

We present a new method which allows us to map the development and structure of scientific and technical research. Our maps permit us a direct representation of the problem situation as this is defined by the international community of specialists in any area at a given moment. They also allow us to display the relationships between problems as these are organised by researchers. In addition they permit us to determine which actors (organisations or individuals) work in a specialist area. Finally we are able to render the strategies of the actors visible.

Our method is based on a systematic analysis of the "co-occurrence" of "keywords" that are chosen to summarise the content of scientific or technical publications. We have used this method to analyse a part of the extensive collection of articles brought together by the CNRS--a collection which grows by 500,000 documents a year.

In our contribution, we stress the sociological relevance of this method of mapping and will argue that it allows us to resolve several difficulties stemming from the method of co-citation. In addition we present findings that have arisen from our collaboration with the CNRS.

Facing the Future at the National Bureau of Standards

Joseph F. Coates

The National Bureau of Standards is faced with the problems of every organization large enough to consider strategic or long range planning. Insofar as strategic planning addresses the changing environment, latent assumptions and comfortable habits, dormant conflicts and startling implications of the future, it may be uncongenial if not disruptive to some elements of the organization. However clear in principle the advantages of strategic planning are, like dieting, exercise, change in lifestyle, or optional open heart surgery for the individual, the organization must face the question - "Is now the time?"

The author recently completed a study for the planning office of the Bureau under the title of 'The Future of the National Bureau of Standards as Effected by Developments in Science and Technology.'

The proposed paper will incidentally discuss the content of that report. The primary focus will be on the strategies, the organizational constraints, the institutional self image and the meta considerations entering into coming to grips with anticipating the future for an organization with a clear mission, high prestige and established role whose external environment is in vigorous ferment.

Assessing Programmatic Efforts by the U. N. System to Foster the Development of Indigenous Scientific and Technological Capacity in Developing Countries

Gerald A. Cole, Institute of Public Policy Studies, University of Michigan

This paper reviews and summarizes a recent attempt by the United Nations Secretariat (Office of Programme Planning and Co-ordination) to assess system-wide efforts by the family of United Nations organizations to foster the development of indigenous capacity in science and technology in developing countries. The paper reviews the concept of developing indigenous scientific and technological capacity and contrasts it to more traditional technical assistance that has concentrated on investment in plant and equipment as well as higher education. The paper then reviews available statistics on expenditures that support programmes in support of capacity development by function as well as by sector. A few case studies are summarized to illustrate the types of problems one encounters in trying to promote indigenous capacity as well as in trying to assess the results. The policy recommendations are summarized. The author is one of three consultants who directed the assessment study. His colleagues included Dr. A. B. Zahlan (Science Policy Research Unit, University of Sussex, U.K.) and Mr. Guy Gresford (former Director of the Office of Science and Technology, United Nations, N.Y.).

Perceptions of Technological Risks

Gerald A. Cole, Institute of Public Policy Studies, University of Michigan

In response to continuing public controversies over large-scale industrial and technical installations, industry spokespersons and governmental regulatory agencies are advocating that the "risks" of the proposed installations should be balanced against the potential "benefits." Risk analysis and risk-benefit studies are being put forth as "objective" methodologies for the resolution of such controversies. Melkin and Mazur, among others, have demonstrated through the analysis of case histories that such "objective" methodologies repeatedly fail to resolve public debate and often exacerbate difficult situations. Research by Slovic, Fischhoff and others suggests that a central problem with the risk/benefit approach is that "risk" is perceived to be a multidimensional concept, only one dimension of which corresponds (roughly) with the formal definition used by the analysts (probability of accident * estimation of consequences). The additional dimensions (e.g., "dread" and "controllability") appear to

outweigh the subjective estimate of consequences as the most important factor in subjective evaluations of technological risk, though explicit research is lacking. Proposals are made for additional research which would explicate the individual decision-processes that lead to implicit preference orderings for risky technologies. In light of the cited literature, and the lack of research on crucial questions, the possibility of establishing a "socially acceptable threshold" of technological risk is thrown into doubt.

The Impact of Public Involvement in Biomedical Policy: Evidence
from Four Case Studies

Diana B. Dutton, Health Services Research Division, Department of
Family, Community and Preventive Medicine, Stanford University
School of Medicine

Many do not believe that the general public has either the ability or the interest to participate effectively in decisions about complex technical issues such as those involved in medical innovation. This paper presents some opposing evidence, based on case studies of four controversial medical innovations: DES, the artificial heart program, the swine flu immunization program, and recombinant DNA research. It describes various types of public involvement in the cases--noting those forms which have been largely symbolic--and examines the impact of such involvement on key policy decisions. While this impact has often been constrained and later undercut, it suggests nonetheless that meaningful public participation is possible even in the most esoteric areas of science policy, that public fears about risks are in many cases not "irrational," and that public contributions may sometimes add valuable dimensions to policy decisions. The paper concludes with a brief discussion of the major obstacles to effective participation and the conditions that have allowed some groups to surmount them.

Exporting the Land-Grant Model: The Rockefeller Foundation in Mexico

Deborah Fitzgerald

In 1943 the Rockefeller Foundation, in cooperation with the Mexican Government, began a program in agricultural improvement in Mexico. Emphasizing original research into agricultural problems, the Rockefeller team aimed to revitalize Mexican agriculture by creating both a pertinent body of scientific knowledge and an elite corps of agricultural scientists. To this end they provided graduate training for promising Mexican agricultural students, rural demonstrations of improved farm practices, and sophisticated agricultural inputs such as hybrid seed and fertilizer.

In spirit and practice, the Rockefeller program adopted the styles of two fairly different organizational structures. The first, common to philanthropic organizations, embodied the belief that a massive but short term dose of money and expertise could not only improve conditions but could infuse the Mexicans with the spirit of progress sufficient to keep the ball rolling after the Rockefeller Foundation departed. The second, most clearly expressed in the land-grant system, reflected the assumption that scientific agriculture should and could be made available to farmers through a multi-level network of research, education, and extension.

This paper will discuss the ways in which these differing approaches were expressed in the Mexican program. I will argue that, unlike earlier programs in philanthropic relief that tended to help those most in need of help, the Rockefeller program more closely resembled the land-grant system which, despite its democratic ideals, tended to produce and disseminate a sophisticated science and technology for more advanced farmers in an effort to improve not the general standard of living, but regional and national agricultural productivity.

LDC Demands for Science and Technology

J. Davidson Frame, Program on Science, Technology and Innovation,
Department of Management Science, George Washington University

By most measures, some three-quarters of the world's population accounts for less than 5% of global S&T activity. The importance of S&T for economic development has not been lost on most lesser developed countries (LDCs). They recognize that S&T has played—and continues to play—a crucial role in the economic growth of the developed countries. The interest of LDCs in acquiring solid S&T capabilities has been particularly evident since the publication in 1970 of the World Plan of Action for the Application of Science and Technology for Development. This interest reached a crescendo in 1979 with the convening of a U.N. Conference on Science and Technology for Development in Vienna.

This paper traces the development over time of LDC concerns for establishing indigenous S&T capabilities, beginning with India's formulation of a formal science policy statement in the 1940s (the world's first formal governmental expression of science policy) and concluding

with present day LDC demands for relatively free access to Western science and technology. Some of the issues the paper touches on are: the role of the Group of 77 in formulating S&T positions for LDCs; the LDC concept of terrestrial and outer space resources as being "the common heritage of mankind"; the politicization of international S&T fora by the LDCs; LDC desires to regulate technology transfers by means of a "code of conduct"; and LDC demands for a restructuring of the international patent system.

State Funding Agencies, Alternatives and Scientific Change

Katrin Fridjonsdottir, University of Lund, Department of Sociology,
P. O. Box 5132, S-220 05, Lund, Sweden

This paper discusses aspects of the organization for research support in Sweden. Although the state funding agencies only form a small part of the Swedish research policy system, they are treated here as a case of policy process in practice. Funding agencies are seen as mediating between the nation's research policy and the scientific community. Their function is thus partly to act as "guardians for the established" scientific community, defining and legitimizing scientific problems as well as how they should be approached and by whom. One important aspect of this function is to guarantee scientific change according to the needs of society. This process of defining and quickening the "correct" scientific and social view of science will be discussed.

A second purpose of this paper is to discuss "alternatives" to established doctrines and how new ideas evolve and are shaped by the societal framework. Some alternatives to established science have their origin in non-academic social movements or organizations, e.g. the ecological movement, whereas others have their inspiration in problems defined by other (social or research) groups. It is argued that the alternatives use different strategies to get economic support through established economic and scientific channels. It is argued, furthermore, that "acceptance and rejection" is generally to be seen as an ongoing (negotiation) process in the pursuit of scientific and social change.

Finally, some more general questions are raised regarding scientific change, in particular the process of negotiations between proponents of new ideas and the established scientific community.

Information Flow through Strong and Weak Ties in Intraorganizational Social Networks

Noah E. Friedkin, Department of Education, University of California-Santa Barbara

Strong and weak ties are compared in terms of their contributions to information flow about the work activity of persons in intraorganizational social networks. Strong ties are more important than weak ties in promoting information flow about activities within an organizational subsystem. Weak ties are more important than strong ties in promoting information flow about activities outside an organizational subsystem. The strength of weak ties in promoting boundary-spanning information flows lies not in their individual efficiency but in their numbers. In general, production of the highest probabilities of information flow is associated with a combination of both weak and strong ties.

Experiments are the Key: A Preliminary Analysis of Scientific
History Making

G. Nigel Gilbert, University of Surrey, UK
Michael Mulkay, University of York, UK

Scientists often describe the history of their research area in terms of the consequences of certain 'key' experiments, but on other occasions they depict the past in terms of the effect of social and personal contingency. An analysis of interviews with bioenergeticists shows that they frequently referred to key experiments to justify their present beliefs, but that opinions about the interpretation to be placed on the experiments and the influence they were said to have had on other scientists varied from one speaker to another and sometimes from one passage of an interview to the next. Nevertheless, similarities were found in the structure of the historical accounts the scientists provided. When key experiments are cited as exemplars in the formal literature, in reviews and textbooks, and in historical accounts written by scientists, the contingency included in some speakers' accounts and the diversity of their opinions about the significance of the key experiments are lost, resulting in strongly empiricist versions of the history of the research area.

Sociologists and historians have often attempted to replace such empiricist histories with alternatives which clearly show the influence of social and personal factors, using as evidence the contingent accounts which scientists provide in informal contexts. However, given the high degree of variability in scientists' historical accounts, it cannot be possible to reconstruct a definitive version of 'what really happened' from them. Instead, attention should turn to the manner in which scientists use devices such as that of a 'key' experiment in constructing versions of the past.

Analysis of Experimental Research on Poliomyelitis, Measles and Yellow
Fever, 1909-1960

Rene I. Jahiel, New York University Medical Center

The research which led to the first correct identification of etiologic agents of poliomyelitis, measles and yellow fever (in 1909, 1911, and 1928, respectively) and to the development of effective vaccines against these diseases (about 1954, 1960 and 1938, respectively) was undertaken with adequate scientific methods early in the XXth Century. The technical and conceptual research problems were rather similar in the three diseases. Yet, there were marked differences in the pace of research among the three diseases and in the time of occurrence of analogous advances. There were several instances of acceleration of research progress as well as delays between the time when the technical prerequisites for a given advance had been achieved and the time when the advance actually occurred.

In order to identify some of the determinants of these delays and accelerations, I performed a quantitative study of the research articles on the three diseases which had been published between 1909 and 1960 and were listed in the Index Medicus or in the Catalog of the Surgeon General. It included enumeration of publications, identification, enumeration and biographical analysis of authors, content analysis of

the papers and citation analysis (using co-citation as well as bibliographic coupling). In addition, review papers, monographs and editorials on the three diseases published in the same period were examined.

The results yielded: a precise definition of several periods of lags or acceleration regarding specific research advances; the identification of a period of regression in research from 1916 to 1927, when correct findings were rejected or neglected and erroneous identifications of etiologic agents of the three diseases were prevalent; identification of cohorts of scientists associated with specific lags, accelerations, or regression; and, identification of changing clusters and networks of research during the period of study.

Analysis of the results, in the context of the development of virology and epidemiology in the XXth Century pointed at several potential determinants of specific lags, accelerations or research regression. These included: technology and know how; research manpower mass; size of research effort on specific questions; availability of resources to qualified and unqualified researchers; feedback among laboratory research, epidemiology and clinical research; competition among different research alleys, hypotheses, models, or instruments, and domination of the field by certain of these approaches with inhibition of the other approaches; de-repression of such inhibitions; understanding of the potential implications of a finding ("know why"); contagion of research ideas originating from another field; movements of scientists across fields of research; characteristics of the cohorts of scientists in a field as that field evolved; "glamour" of certain discoveries and or areas of research; socio-economic or political events external to the science, but affecting it; political or economic correlates of certain research objectives; and, nature of over all design of the research effort. Various combinations of these determinants explained most of the observed lags or accelerations.

Since the determinants of lags or accelerations found in this study may be operative in current research, the present paper may be relevant to science policy as well as to historical research. The results yielded by this study may also be relevant to theories of science and they will be discussed in relation to the models developed by Toulmin, Holton, Kuhn and others.

Denial of Parapsychology Research Outcomes

Peter A. Koefoed, Netherlands Universities' Joint Social Research Centre
Willem A. Verloren van Themaat, Netherlands Universities' Joint Social
Research Centre

In the context of wider research into parapsychology the argumentation of a wellknown natural scientist re the outcomes of parapsychology research (J. Taylor, Science and the Supernatural, London 1980) is analysed. The analysis was made by collecting all concluding statements of his book (149 items) and clustering them into 9 main interrelated arguments. The argumentation was, in short:

1. Simplistic reasoning
 - 1.1. Antithesis parapsychology research outcomes vs SCIENCE
 - 1.1.1. Materialism as explanatory regulative
 - 1.1.2. Electromagnetism as explanatory basis
 - 1.2. Talking double Dutch
 - 1.2.1. Unbalanced denial or neglect of parapsychology research outcomes
 - 1.2.1.1. Absolutizing of his own experiments
 - 1.2.1.2. Absolutizing of the quantitative
 - 1.2.2. Trivial alternative explanations

This outcome of the analysis will be used in further research, more oriented to social factors.

Temporal Order in Laboratory Work

Michael Lynch

The paper discusses a selection of ethnomethodological studies of laboratory work in biology, chemistry, and astronomy with a focus on the topic of temporal order in laboratory work. Ethnomethodological studies of work provide original uses of the Phenomenologists' insights on the temporal structure of ordinary objects and activities. Social activities and social structures not only occur 'in time' but are achieved through members' production and concerted use of sequential coherences in conversation and embodied action. Laboratory experiments and observations are noted for the systematicity of their temporal production, though it is less often noted that they are inevitably produced in 'real time' as vernacular conversations and unremarkable bodily manipulations of science's 'things'. The question this raises for ethnomethodological studies is, "How does the discipline of any science arise in the midst of such vernacular conversations and bodily manipulations?" Several studies suggest a response to that question by detailing ways in which successions of activities are temporally ordered in actual situations of natural science inquiry. Some of the issues that will be treated in the paper are: I. Canonical descriptions of experiments and actual courses of lab work, II. The embodied organization of laboratory bench-work, III. Scientific discourse and situated planning, and IV. The retrospective assembly of scientific methods on the basis of results-in-hand. Transcripts of spontaneous laboratory shop talk and ethnographic descriptions of scientific work-in-progress will be used to specify and develop the above themes.

Measuring the Quality of Papers and the Dynamics of Fields

James MacAulay, Science Council of Canada

Progress in citation analysis is hampered by several factors, including fundamental variations in papers per author from one research area to another, geographical and disciplinary variations in the adequacy of ISI coverage, and the introduction of subjective selections in defining the boundaries of research areas. An additive and directional measure of the relevance of source objects to each other is proposed, based on the cost of enquiry experienced by citing users, and the entropy in a graph of their usage paths. A clustering algorithm which partitions relevance digraphs into equivalence classes is described.

This results in a method for defining research areas and measuring their vintage, entropy, and relevance: three factors thought to be sensitive to the currency, demography and degree of consensus or paradigm closure in the dynamics of specialities in research fields. Some results are described from an implementation of these procedures to the system of ISI journals.

Systematic Categorization of Human Goals as a Tool in Social
Studies of Technology

D. J. Montgomery, Michigan State University

Schemes for assessing the social impacts of technological undertakings are likely to gain in credibility when they embody a plausible and explicit criterion for characterizing the quality of life. Successful identification and systematic categorization of human goals would seem to offer hope for realizing such a criterion. A specific formulation towards this end is attempted herein, with the categorization of human goals serving to define the "good" in a generalized utilitarianism that seeks the greatest good for the greatest number under the constraints of limited resources and disparate interests. The "number (of people)" is incorporated in the form of societal sectors each of which comprises individuals having common concerns. The "greatest" is expressed through satisfaction indexes containing parameters that define the value systems of the societal sectors and the decision makers. Mathematical expressions are proposed for first approximations to the indexes, and empirical methods are suggested for determining the parameters appearing in them. The implications and the promise of the methodology, even in qualitative form, are set forth.

Scientific Jokes Should Not Be Laughed At

Michael Mulkay, University of York, UK
G. Nigel Gilbert, University of Surrey, UK

Sociologists have paid little attention to the humorous aspects of scientific culture. Not only do scientists' jokes, irony, cartoons, etc., constitute a virtually untouched topic, but it is difficult to see how any of the dominant analytical perspectives in the sociology of science could be extended to deal with this topic. The present paper is an attempt to show that one new analytical perspective, namely, discourse analysis, can provide interesting interpretations of various kinds of scientific humour. It is suggested that this is but one indication of its potential analytical fruitfulness.

Kuhn--The Conservative and Radical Interpretations

Trevor Pinch

This paper focusses on the influence of Thomas Kuhn's ideas on empirically-oriented work in the sociology of science. It is argued that within such work two distinct interpretations--the conservative and the radical interpretations--of Kuhn's ideas can be found. The conservative interpretation is characterised by the separation of cognitive and social components of science, whilst, within the radical interpretation, the integration of social and cognitive factors is stressed. Examples of the two interpretations are given. The dichotomy between the conservative and radical interpretations of Kuhn is compared with other dichotomies used to

describe recent work in sociology of science e.g., Mertonian vs. Kuhnian, N. American vs. European, and normative vs. interpretive. It is argued that Kuhn, himself, has over the years made his views consonant with the conservative interpretation of his work. It is suggested that the term "Kuhnian Sociology of Science" be laid to rest.

Technical Nuclear Knowledge and Attitudes Toward Nuclear Power
Before and After TMI

John H. Reed, Energy Division, Oak Ridge National Laboratory
John M. Wilkes, Department of Social Science and Policy Studies,
Worcester Polytechnic Institute

Levels of technical nuclear knowledge as measured by a five item knowledge score are compared for two samples of 1,000 Massachusetts residents. One sample was taken just prior to the incident at TMI and the other was taken a year later in March, 1980. The considerable media coverage of the technical aspects of nuclear power generated by the incident at TMI did not greatly increase people's level of technical knowledge. Almost all of the change in the distribution of knowledge scores between the two samples is attributable to an increase in the number of people who could identify a meltdown as a serious accident in a nuclear plant. However, there is a significant correlation between knowing the correct response to the meltdown question and having seen the movie, The China Syndrome. TMI strengthened certain misperceptions, for instance, the misperception that plutonium is the main radioactive fuel in existing power plants. Finally, analysis of the data suggest that the attitude shifts resulting from TMI were not so much a result of changes in knowledge as changes in the perception of safety.

Science Policy and the Developing Societies--A Case Study of the
Indian Experiment

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"Science Policy" in a developing nation does not merely stand for allocation of funds and management of organisations. Rather it concerns itself with issues of generation of new dimensions of knowledge and its application to the development of society--new institutions and value-perspectives. Problems of formulation of the Policy, therefore, directly relates to the nature and direction of development and change envisaged by its political leaders. The temptation to go for advanced S&T will understandably be strong. But where the economic system is moribund and the country is burdened with "imitative" outlook in its public policy, no matter how advanced S&T is imposed it would not lead to any significant advancement in its socio-economic systems. On the contrary, introduction of the new S&T is likely to re-strengthen the old social order

It is to the credit of India that it has within one generation of its independence achieved the third largest scientific manpower in the world. But the S&T efforts have not yet become vectors of social change. On the basis of India's energy policy (including nuclear power policy) and constitutions of its apex scientific bodies, the paper discusses various determinants of Science Policy in a third world country.

Engineering and Architecture: Ethical Issues in the Self-Regulation
of the Professions

Hedvah L. Shuchman, Center for Technology Assessment, New Jersey Institute
of Technology

The subject of this paper is a pragmatic approach to the study of ethics in the scientific and technical professions, one which recognizes the importance of the economic aspects of the ethical issues which concern the professions.

Changes in societal conditions and in the nature of the professions themselves, have affected the character and content of self-regulation in the professions. These changes have produced new interpretations of regulatory laws and statutes and modifications of professional canons. However, despite alterations in the political and legal status of the professions, most professions remain in control of the organization of their work, define what behavior is ethical and design and implement the formal and informal systems of sanctions used in governing their members.

On the basis of a recent NSF-funded study of the professions of law, medicine and accounting, the system of self-regulation appears alive and well. However, the AAAS Professional Ethics Project which examined activities in scientific and engineering societies concluded that there is no effective and organized program addressing the ethical issues confronting scientists and engineers. Do the scientific and technical professions differ so radically from other professions? This appears unlikely. A different research approach may identify the existence of ethical concerns which the AAAS project found lacking or inadequately considered.

Structural Characteristics and Citation Rates of Education Journals

John C. Smart, Virginia Polytechnic Institute and State University
Charles F. Elton, University of Kentucky

The frequency with which scientific papers are cited in the journal literature has been shown to be related to the quality and scholarly stature of individual scientists, academic departments, and scientific journals. This study demonstrates that nearly two-thirds of the variability in the citation frequency of 148 education journals can be explained by five structural characteristics of these journals. The relative importance of each structural characteristics and its relationship to qualitative considerations are discussed. The practical implications of these findings for those responsible for the administration of institutions of higher learning and their contribution to the study of the scientific communication process in the field of educational research are presented.

Scientific Immigrants in Venezuela: Ethnicity, Nation, and International Science

Hebe M. C. Vessuri, Science & Technology Center of Development Studies,
Central University of Venezuela

Among the main mechanisms of incorporation of incipient peripheral scientific communities to international science I isolate for analysis in the present paper the participation of foreign scientists in local teaching activities and in scientific and technological research. My argument refers to the recent inflow of foreign scientists into Venezuela.

At a time when the problem of national identity and loss of cultural values is being locally raised in response to the massive inflow of foreigners, parallel to the also significant process of development of scientific activities in the country, science, the same as other aspects of 'cultural' life, has become the object of a controversy expressed in terms of national identity, ethnicity or 'disnationalization'.

In particular, I consider the case of Argentine scientists in Venezuela to illustrate the phenomenon of intra-regional migration and its effect on the "national"/"dependentist" controversy. There are several reasons for this choice. Venezuela is one of the very few Latin American countries that has emerged as a new area of substantial demand for professionals and skilled labour, as a consequence of the oil boom and political stability. On the other hand, Argentina, which until the Thirties was a typical immigration country, by the turn of the Fifties began to produce a limited outflow of 'brains' marked by two great peaks of expulsion of trained personnel, one in 1966 and the other starting in 1975. In both cases there were significant groups of people who chose Venezuela as their destination.

The analysis aims to show that although the emigration of Argentine scientists in 1966 was underlined by the demonstration of the possibility of developing a Latin American science (efficacious because it was of international standard) and although the debate between "national science" and "scientism", centered in the Ciencia Nueva journal that was published in Buenos Aires, had a wide diffusion in the rest of Latin America, their transplant to other Latin American countries -in the case under consideration, Venezuela- did not alleviate the direction of the scientific and technological dependence; but rather, in contributing to scientific and technological modernization, it increased the links articulating the local scientific community to the world system.

Serendipity--Or Discovery by Intention

J. M. Ziman, University of Bristol, UK

Research is not mere random exploration and observation.

Research projects need to be planned in advance, often over many years, with very large resources. To understand how science proceeds we have need to consider the rationale of research plans as well as the rationale of the interpretation of research results.

A research plan can only be made in the light of current knowledge and is, therefore, peculiarly dominated by existing theoretical paradigms. The growth of knowledge is more sensitive to social opinion through this prospective influence than it is from retrospective analysis.

But every research plan must allow for the unexpected.

"Serendipity" is often treated as a random, irrationalising factor in science. But its role can be understood when we distinguish between the fortuitous combination of circumstances opening the way to the intimation of a scientific discovery and the deliberate action needed to exploit this opportunity.

Social Responsibility in 19th Century Science

J. M. Ziman, University of Bristol, UK

Concern for the social implications of science is not something quite new. From a survey of articles, editorials, news, and views, in the volumes of NATURE of a hundred years ago, one can see, for example, that the scientific community was just as concerned about environmental issues, such as the pollution of rivers, as it is to-day. Of course, with so little government support for science there was little interest in 'science policy', but military technology had fascinations even then. In those days scientists believed in the "civilizing" role of science and took a much more active part in science education and popularization than they do now. But allowing for the tremendous change in social circumstances and in the content of science itself it is surprising how many major modern themes were already present in the literature of a century ago.

Positions Available

UNIVERSITY OF VICTORIA. The Department of History, University of Victoria, invites applications for a permanent appointment in the history of science and/or technology. Preference will be given to specialists in the inter-relationships of science and society. This appointment will be at the associate or full professor rank. Candidates must have a good publication and teaching record and be interested in interacting with colleagues in related disciplines. Rank and salary will be commensurate with the applicant's qualifications and experience. Competition will be closed on 1 February 1982. Letters of application, including a curriculum vitae, should be sent to Dr. W. R. Wooley, Chairman, Department of History, University of Victoria, Victoria, B.C., V8W 2Y2.

RENSSELAER POLYTECHNIC INSTITUTE. RPI seeks a scholar to serve as Research Professor for its Center for the Study of the Human Dimensions of Science and Technology. The successful candidate will have an established record of publication and the ability to maintain an active research program while working with others to promote the growth of the Center. He or she should have a demonstrated ability to work with existing faculty to develop and obtain funding for projects on the social impact of science and technology, related social policy questions, and problems in the history, sociology, and philosophy of science and technology. Appointment may be at the associate or full professor level. Funds are available for an additional person to be recruited under appropriate equal opportunity procedures. Applications are welcomed from engineers, scientists, humanists or social scientists. These should include a letter of interest, resumé, and list of references. Send to David L. Ellison, Director, Human Dimensions Center, School of Humanities and Social Sciences, Rensselaer Polytechnic Institute, Troy, New York 12181, by December 15, 1981.

Forthcoming Meeting

Historicians of planning are holding a luncheon at the meeting of the Organization of American Historians in Philadelphia at the Franklin Plaza Hotel, noon, Friday, April 2, 1982. The luncheon is sponsored by the Planning History Group. John L. Hancock, University of Washington, will preside, and Blaine A. Brownell, University of Alabama at Birmingham, will present an address on "Planning History and Planning Policy." There will be a short meeting afterward for organizational purposes. For additional information contact Mark H. Rose, University Program in STS, Department of Social Sciences, Michigan Technological University, Houghton, Michigan 49931, 906-487-2115; or William H. Wilson, Department of History, North Texas State University, Denton, Texas, 817-788-2034.

ERISS Conference

A conference on "Epistemologically Relevant Internalist Sociology of Science," (ERISS) sponsored by Syracuse University, was held at Cazenovia Lake, New York, June 20-27, 1981. The goal in the mind of the organizers, was to bring together theorists of science concerned with the problem of whether the social institutions and relations among scientists have been (or could be) organized so as to produce collective belief-changes that improve the validity of the beliefs held by the scientific community about their focal subject material. Participants included both those who held that there are no such processes or results as well as those who believe that science is an effective truth-producing social institution, but all participants regarded the issue as needing attention. This homogenizing limitation still left great room for productive disagreement.

The phrase, "Epistemologically Relevant," might be interpreted as excluding an important group of historians and sociologists of science who carefully avoid allowing present-day science's acceptance of the truth of a belief to serve as an explanation of why the belief was chosen over competing beliefs at some prior historical period. This methodological rule, however, need not exclude an interest in the social system differences between astronomy and astrology, for example, nor conjectures as to which social system, if either, might be more likely to produce belief-changes in the direction of better match to the referents (if any). But even full fledged epistemological agnostics were "epistemologically relevant" for this conference, both for their sociological explanations of scientific beliefs and for the vigorous criticism they offer less agnostic participants.

"Internalist" was used in a sense borrowed and slightly shifted from the "internalist/externalist" contrast in the history of science. Its use here is not to deny the epistemological relevance of cultural context, societal structures, and social upheavals affecting science, but rather to narrow the scope of this conference to the social system of information sharing, persuasive efforts, recruitment of believers, etc., within a science. Any case for the efficacy of scientific methods must make it plausible that some aspects of this intra-scientific social system could under some conditions produce changes in shared beliefs about the physical world that improve the description of that world. Such a hypothetical optimal internal system of science might, of course, be precariously sensitive to the larger societal-cultural context.

In some sense, the conference organizers aspire to "sociologically causal theories of science" along the line of the "causal theory of perception" recently reactivated in a naturalistic justification of perceptually generated beliefs rather than as a term of disparagement. Such a causal theory of perception is itself a corrigible empirical hypothesis, and, in so far as true, can be used to explain both general competence and illusory falsehood under unusual circumstances. What this conference sought are hypothetical sociological causal theories of belief change that could play a similar role for scientific beliefs.

The organizers' saw their personal agendas as follows:

Campbell is a social psychologist turned research methodologist and lately theorist of science. He accepts epistemological relativism but stops short

of ontological nihilism. His agenda for the conference was to extend his evolutionary epistemology via social evolution into the social processes of science. His program falters here because it attributes all "fit" (adaptation, validity) to selection, and because we know enough about a wide variety of selective processes impinging on scientific belief assertions to see that many selectors are tangential or inimical to improved accuracy in the description of nature. Campbell also anticipates that a demarcation between science and other belief traditions may be found in science's socially institutionalized dependence upon vision and touch for settling factual disagreements, thus providing a linkage to a causal theory of perception.

Rosenberg is a philosopher who has published in the philosophies of physical, biological, and social sciences. While accepting many of the current criticisms of logical positivism, he continues to emphasize the unique status of the scientific method as a means of advancing truth about the physical, biological, and social worlds. He can conceive of no satisfactory explanation for the direction of scientific and technological change which does not hinge on according the succession of theories a succession of increasing approximations to truth. But he recognizes that this feature of scientific change must be the function of social forces governing scientific activity.

Among those in attendance were the following:

Philosophers: Richard Boyd, Mark Brown, Alvin Goldman, Susan Haack, Larry Laudan, Thomas Nickles, Rita Nolan, Alex Rosenberg, Peter Skagestad, William Wimsatt, Michael Zenzen; Sociologists: David Bloor, Thomas Gieryn, Karin Knorr, Roger Krohn, Sal Restivo, Richard Startup, Steven Woolgar; Historians: (including philosophers doing history of science) William Bechtel, Larry Hardin, David Hull, Thomas Kuhn, Rachel Laudan, Donald Moyer, Joan Richards, Robert Richards, Martin Rudwick; Social Psychologists: Donald Campbell, David Krantz, Robert Rosenthal; Anthropologists: Barbara Frankel, Rik Pinxten; Evolutionary Theorist: Peter Richerson.

While no advance papers were required of the participants, some came with specially prepared papers, and most distributed relevant papers previously published. Post-conference position papers are anticipated. These should be solicited from the participants individually, in as much as no collective product has yet been assembled.

The conference achieved unusually vigorous and sustained interaction between philosophers and sociologists of science, with the sociologists favoring the skeptical or agnostic argument in the lengthy epistemological arguments. A symposium on the conference and the issues is scheduled for the 4S meetings in Atlanta, November 5-7, 1981.

New Doctorates

JEFFREY STURCHIO has been awarded the PhD for studies undertaken in the Department of History and Sociology of Science at the University of Pennsylvania. The title of his dissertation is "Chemists and Industry in Modern America: Studies in the Historical Application of Science Indicators." Dr. Sturchio has been appointed Assistant Professor of History in the Department of Humanities, New Jersey Institute of Technology, Newark, NJ.

DAVID MILLER has been awarded the PhD for studies undertaken in the Department of History and Sociology of Science at the University of Pennsylvania. The title of his dissertation is "Metropolitan Science in the Age of Reform: A Study of the Changing Role of the Royal Society of London, 1815-1835." Dr. Miller has been appointed Lecturer in the School of History and Philosophy of Science, University of New South Wales, Kensington, NSW, Australia.

Call For Proposals

CURRICULUM MATERIALS IN ENGINEERING ETHICS. With the support of a two year grant from the Exxon Education Foundation, Illinois Institute of Technology's Center for the Study of Ethics in the Professions will produce a series of modules to be used in undergraduate courses in contemporary moral problems, technology and values, and engineering ethics and graduate and continuing education programs for engineers. The grant will enable the Center to prepare, test, evaluate, and distribute these self-contained instructional units, each treating in-depth a problem of engineering ethics. The modules will consist of an analytical essay, case studies, and a bibliography, all relating to a specific ethical issue.

Prospective authors should submit proposals on such topics as confidentiality and the public welfare, whistle-blowing, informed consent, and pro bono responsibilities. Individuals from the fields of engineering, philosophy, behavioral and management sciences are eligible to apply, either as single or joint authors. A stipend of \$1200 will be provided for each module. Proposals on the above or other topics should identify the problem and describe the approach in no more than five double-spaced pages, accompanied by a vita, and submitted no later than January 15, 1982. A national advisory panel will evaluate proposals and oversee the entire project.

Submissions and inquiries should be addressed to Dr. Vivian Weil, Series Editor, CSEP, IIT Center, Chicago, Illinois 60616.

4S ELECTION RESULTS

The election of new officers who assume responsibilities during the Sixth Annual Meeting are as follows: President, ARNOLD THACKRAY; Secretary-Treasurer, LOWELL HARGENS; Council Members, Rae Goodell, Walter Hirsch*, John Holmfeld, Linda Lubrano, and Spencer Weart.

*Walter Hirsch will serve the year remaining in the term of former Council Member Arnold Thackray--now President Thackray.

4S *Society for Social Studies of Science*

The 4S Newsletter is published four times each year, beginning with V.6:3 at the Department of Sociology, Texas A&M University, College Station, Texas 77843 and sent to all members of the Society for Social Studies of Science. Membership is on a calendar year basis. Membership dues (\$15 for professionals, \$5 for students) and institutional subscriptions (\$25) should be sent to: The Secretary/Treasurer, 4S, Department of Sociology, Indiana University, Bloomington, Indiana 47405.

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