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THOUGHT AND OPINION

4S at AAAS

Memorial Day weekend in New York was the testing ground for a 4S presence at the meeting of the AAAS. The society sponsored four sessions, two on Sunday and two on Monday, and a cash bar party on Monday night. The AAAS office seemed unhappy at the attendance at the meeting as a whole. The four 4S sessions had above average attendance with the peer review session on Monday morning being the hit of our sessions attracting a New Scientist column* by Michael Kenward, focusing on Rustum Roy. The other sessions were: The Role of Federal Laboratories, Funding for the Growth of Knowledge, and the Ethnography of the Laboratory.

Adding to the 4S presence was Arnold Thackray, former President, giving a major address on Sunday, and Dorothy Nelkin, another former President, newly installed on the AAAS Council.

The 4S cash bar attracted about 60 people at the usual outrageous New York hotel prices.

Obviously, mere numbers of attendees do not signify an important session. But the AAAS meeting is not a place for the 4S to have sessions that interest just ourselves. The long lead times and the lack of the significant audience to which our more technical and forward looking papers are addressed move the focus outward from the 4S community. Public sessions can attract needed attention to our existence and activities. Sessions which appeal to more limited audiences of natural scientists and others interested in science and science policy can also be successful.

The S-STC program at Penn State provided a flier about their new NSF sponsored program and a guide to STS activities at the AAAS meeting. Although not all of the 4S sessions made the list, most did, and it proved a good guide to the more general audience.

The immediate reaction to some 4S Council members and others was that the experiment of a 4S presence at the AAAS was worth continuing another year. The call for 1985 Los Angeles sessions and papers has already gone out.

Nicholas Mullins
President, 4S

*Michael Kenward, "Peer review and the axe murderers." New Scientist
(31 May 1984): p. 13.

**"Mandated Science": A Workshop and Project Report
Vancouver, Canada, April 1984**

by

Brian Wynne

University of Lancaster, UK

In the last decade or so academic and policy work from various disciplines has recognized the emergence of something new in the hybrid field where science and policy interpenetrate. Environmental and health and safety regulation, new political concerns, new legislation, and new institutional configurations (such as regulatory bodies grappling for credibility), have created the existence of science more directly and explicitly shaped by policy concerns, yet still claiming the mores, authority and independence of conventional science.

Yet for all its manifest substance and frantic activity, this new field is badly structured and has no remotely clear identity, especially in its intellectual principles. Conventional criteria of scientific epistemology in a given specialty may be confused with, e.g. legal standards of evidence and proof in public hearings. Inference bridges needed to create scientific judgements relevant to policy may be scientifically highly uncertain, yet the different options signify different policy conclusions. Translation between subcultures of science and forms of policy making often appears to occur with no awareness of the different principles, criteria and values involved.

So far, attempts to lend this ill-defined area an identity have been few. Recently an initiative centered on Simon Fraser University Department of Communications and the University of British Columbia has conceived the term "mandated science" to try to characterize the area as it arises in health and environmental risk assessment and standards setting. With the aid of a 2-year grant from the Canadian SSHRC, the group has conducted empirical research on several public inquiries, and on other specific regulatory issues such as lead, chlorphenol and captan, including interviews with participants and participant observation. The aim has been to determine whether there is anything intellectually or institutionally characteristic of "mandated science" which gives it a particular identity, e.g. in distinction from "disciplinary science" or from policy making without scientific inputs. An underlying policy concern is to see whether this area needs improvement, and whether it could be improved, by better definition of its ground rules, boundaries, structure and proper memberships.

To this general end a recent workshop was held at Simon Fraser, especially to explore what if anything useful the sociology and history of scientific knowledge could say to the sociological analysis of "mandated science." Participants included Trevor Pinch (York) and Brian Wynne (Lancaster) from England, Gus Branigan (Calgary), Marike Findlay (McGill), John Robinson (Waterloo), Stephen Straker (UBC), and the project directors, Bill Leiss, Liora Salter, Ed Levy (UBC). One of the main themes of presentations was whether, in the light of recent sociology of scientific knowledge, mandated science was anything intrinsically different, e.g. in the role of values and interests in scientific judgement, from "orthodox" science. Does it make any difference if a field is developed under explicit or implicit social "mandates?" And if an already institutionalized field is

unexpectedly pervaded by social concerns? Does it make any difference if either of these begin with a disinterested concern for the truth, e.g. about risks, or with a concern to confirm one view of such risks? What kinds of implicit mandates might be embedded in explicit ones?

Another theme was the significance of discrepancies in scientists' own accounts of their practices when those (and sociologists') accounts themselves, as well as knowledge claims, became a legitimate part of public interest if a scientific field becomes relevant to policy.

Analytically, there may be no particular identity to "mandated" science; yet the social demand for the activity, and response to the demand, grows inexorably, whatever the specific credibility of science in such spheres. It may be valid therefore to draw artificial boundaries and create an artificial identity for the field even if this "leaky" identity needs continual re-negotiation and patching. After all, are we not nowadays instrumentalists? The justification for this may run as follows:

Orthodox science shows discrepancies between formal accounts and informal procedural realities. The formal norms may be rhetorical instruments, but as such they are not "merely" rhetoric. Scientists may invoke norms of disinterestedness or universalism, or more specific and substantive norms, in their internal arguments with others; thus these may constrain practice (and thus quality) within certain limits, even if they cannot be said to strictly describe and determine it. In this sense science has been recognized as un-ruly, but not at all archaic. Regulatory science, or "mandated science," contains sometimes more explicit but still badly defined policy concerns and implicit norms intermingled with disciplinary ones. Its reference groups, audiences and potential controls are more fragmented and diffuse, and the pressures towards dishonesty and shoddiness far stronger yet worse insulated. Therefore the need exists to articulate a distinct identity containing a normative ethos. This again will not determine practice, but it may constrain it. The next step may be to develop answers to the question, what criteria and objectives could and should such as ethos embody?

Sociology of knowledge can help to define what might be realistic (and honest) goals. If empirical truth alone can no longer be left to carry the can for our political primitivism and ineptitude, do we need, for example, to build in criteria of social development (e.g. improving public understanding and expanding or exploring the territory of negotiation), into the "mandatory science" arena?

These questions touch the heart of critical theory concerns around legitimation and authority, issues which were extensively discussed, and which Bill ("the domination of nature") Leiss is well fitted to tackle. An immediate analytical concern of the project, however, is to examine the nature of different institutional contexts of use of "mandated science," to see what patterns and processes of translation occur between orthodox disciplinary sciences and such arenas. It may even be that mandated science can only be defined in relation to such institutional settings.

A collection of essays is being planned which will discuss various aspects of the notion of mandated science, using European and North American empirical materials. The main project director, Liora Salter, would like to make contact with work and workers in areas of 4S activity relevant to the "mandated science" theme.

[In Vol. 2:1 of 4S REVIEW, we announced the publication by the Council for Science and Society, UK, of The Significance of Science Studies. We noted also its availability, but through the efforts of Steve Woolgar, John Ziman (Chair of the Council for Science and Society), has generously permitted 4S REVIEW to print the 10-page report in its entirety.--Ed.]

Introduction: It is commonly assumed that only people who are deeply immersed in a scientific discipline, or in technological or medical developments, are competent to comment on these fields. Paradoxically, it often seems that scientists, technologists and doctors are the very people who find it most difficult to relate their professional training and activities to their role in society. An outstanding example is the desire by engineers to be received as 'professionals', as documented in the Finniston Report – a desire which cannot be attained by greater technical knowledge but only by more thorough understanding of the place of engineers and engineering in society.

Awareness of the need to understand science as a distinctive intellectual and social activity is by no means new. For fifty years or more, the History and Philosophy of Science have been studied and taught in British universities, and this encompassed some work on the history and social roles of technology and medicine. In the post-war period, not only has this activity been broadened and consolidated, but additional areas of study on sociological, political, economic and policy aspects have opened up. In the past fifteen years, this activity has spread into polytechnics and colleges. Some universities are now teaching a variety of courses at undergraduate and postgraduate level, and most universities and polytechnics have one or more members of staff, qualified in some branch of science studies, who contribute to the teaching of students in the sciences, social sciences and the humanities (see the Nuffield Foundation report (1981) on the extent of teaching in these subjects). There have been similar developments in other countries, notably the U.S.A., Australia and Holland.

'Science Studies' is thus a term which covers a number of academic studies centred on the activities of scientists and technologists in society. Whilst not pretending to be a coherent discipline in its own right, it is bringing together scholars, research methods and conceptual schemes from a variety of disciplinary traditions. This present 'unity in diversity' is one of its educational virtues, since it opens the way to a wide range of intellectual approaches in the social sciences and humanities whilst

showing how they can all apply to a single topic. By following one or more of the possible approaches, students can get a broad view of the social significance of their main studies in science, technology or medicine, and begin to appreciate some, at least, of their cultural, political and economic implications. For students specializing in the social sciences and humanities, it can give an idea of the real nature and capabilities of science, as a body of knowledge and as an agent in human affairs.

Philosophical aspects: To indicate the scope of Science Studies, it is convenient to consider first the contribution from philosophy. The central concerns of the Philosophy of Science are the analysis of the concepts and methods of the sciences, the relationships between the sciences, and the status of scientific theories as knowledge. These questions may have to do with, for example, the legitimacy of particular kinds of scientific concept, or the adequacy of some accounts of scientific method or the certainty of the knowledge claimed by science. There is no doubt that the natural sciences are dramatically successful; philosophers of science seek by their analyses to attain a deeper understanding of the nature of that success.

There has always been an interaction between scientific and philosophical theorizing, and indeed it has been noted that during periods of crisis, discussion of a "philosophical" character feature in the deliberations of practising scientists as they attempt to remould fundamental concepts. When the creative scientific work is finished, philosophical analysis can assist in making clear the character of the achievement, by, for example, articulating the nature of the radical conceptual shifts which typically accompany a revolutionary change in science.

Thus the careful analyses of philosophers of science can have a pedagogical function, in helping students to think clearly and critically about the content of the science they learn. They may have a creative function in helping to identify and map conceptual minefields which have to be negotiated in developing new disciplines. This seems very necessary, for example, in the emergent areas of 'artificial intelligence', 'expert systems', and 'knowledge-based systems'.

Many writers try to integrate the findings and theories of the sciences into frameworks of wider significance, relating them to general metaphysical systems, religious theories or political ideologies: one of the tasks of the philosophy of science is to analyse and criticize those attempts. Though this activity does not of itself generate new discoveries, it is important as one of the ways in which the content of the sciences is assimilated into our culture. Related to such attempts but of more immediate significance for the practice of science is the question whether the sciences have an essential unity of methodology and conceptual apparatus, or whether the sciences exhibit an irreducible pluralism.

Science, of course, is not just a body of theory but a practice which embodies a commitment to certain values. One task for the philosophy of science is the articulation of the values which are a precondition of scientific activity, and the examination of problems which arise when those values conflict with others.

Sociological aspects: The traditional philosophical accounts of science are now recognized to be inadequate to explain its success and reliability as a knowledge producing activity. Sociology of science examines the organisation and nature of the scientific institutions (in the broadest sense) that maintain and nurture this activity. Sociology of scientific knowledge explores the methods, nature and organisation of knowledge generation within science.

There are recurrent crises in science - about frauds, about the development of so-called 'pseudo-sciences' and their impact on the public, about periods of misdirection such as the Lysenko period in Russia, and about the stultification of important areas as the more glamorous and expensive topics suck up the major proportion of available funding. The sociology of science provides a background of information and understanding which makes possible informed analysis of these problems. It does so, for example, by exploring the norms of the scientific community, and the institutional settings within which these norms can survive. It looks at the value conflicts between the pursuit of knowledge and the pursuit of industrial and military production, and thus links with the study of industrial sociology and managerial methods. It looks at the mechanisms for the distribution of research funds within

the developed nations, and at the conditions for scientific growth in developing countries. Finally, it can apply theories from the wider body of sociological work - such as theories of deviance and theories of information transfer - to problems within science such as fraud and the growth of scientific communities.

Sociology of scientific knowledge explains how our knowledge of the natural world develops objectivity and solidity. It explores together methods that have been used to produce certain knowledge at other times and places and thus makes possible a proper understanding of the use and misuse of scientific methods and scientific expertise. It helps to explain puzzling failures to resolve disputes between different expert communities and the way the political debate can be prematurely closed by selective use of expert opinion.

Political and economic aspects: Many of these concerns involve more general political and economic considerations and call for the incorporation of the corresponding disciplinary skills. Some of these considerations relate to the polarisation of views produced by diverging political and economic ideologies; where there is no clear political party division (as for instance in the case of nuclear power), debate about options in technology has been substantially different in character, and usually difficult to mount. The student can be brought to see how an issue such as this is more than a matter of uninstructed opinion; it calls for careful, well-informed analysis based upon established principles of economics, political theory, and managerial experience.

At the international level, the prime subject might be the technology and politics of economic and social development. This would include consideration of the diffusion of cultural values, the transfer of technology, and the activities of multinational companies and international organisations. In the UK context, the value of "technology assessment", the political role of the expert, the interaction of government sponsorship and regulation of technology, the scope for participation and accountability in political discussion of some of the many analyses of industrial, post-industrial, "technetronic" and "technological" society, are all appropriate areas of study. Such questions are difficult, and their analysis must be rigorous if it is to be of value. In general, such rigour can only be a product of systematic study,

guided by the conceptual frameworks and well-founded principles of the established academic disciplines of economics and politics.

Historical aspects: The different disciplines within the "Science Studies" family focus on different aspects of science and technology, but the subtle relationships between these approaches are steadily becoming more evident. The sociology of science, for example, is having a significant effect on the theory and practice of science policy, through the development - and critique - of quantitative indicators of scientific performance. The philosophy of science can be examined sociologically, perhaps as a sub-culture interacting with the rhetoric of science. The societal values that influence the politics of science and technology call for careful philosophical analysis - and so on, in a complex web of interconnections.

The interdependence of the various approaches to science and technology is nowhere so clear as in historical studies. These were the original base of science studies in universities: they continue to provide the ground for coherence in science studies, as well as a major part of its intellectual excitement. Where social scientists seek generalisations, historians seek explanation of the peculiar; they use and test generalisations in attempts to understand particular complex happenings. These may be very specific in time and place, like a manuscript note by Newton, or very general, like British atomic policy; they may involve considerable scientific knowledge, but they may equally, perhaps additionally, demand a wide understanding of the culture, policy and economy of an extended period.

At the simplest level, historical studies provide 'cases' for social scientists or philosophers; they teach by example. Recently, some policy analysts have used the techniques of contemporary history, to make explicit judgements about the relative success of scientific programmes and the wisdom of past policy decisions. The potential for studies of this kind is considerable: but if they are to avoid hindsight that is too easy, or quantification that is too mechanised, they will need to be informed by the sensitivity of more general historians about changes in context and subtleties of interpretation. Only the accumulation of 'recent' historical studies will provide the background against which past policy-decisions can be properly understood and evaluated.

But historical studies are more than just 'case studies'. Our understanding of the past is the framework against which we tend to judge both our present and our possible futures. We read some aspects of our present as 'inheritance'; others we perceive by contrast with previous forms. Science, like our social institutions, needs to be seen as a developing social system. The faster a system evolves, whether it be atomic theory or a major industrial organisation, the more we need to understand its evolution; the less we can afford a static model. We accept this principle easily for industry: historians of science, technology and medicine see and offer a similar mode of understanding, even for the most technical or abstract of their objects of study.

Because historians seek synthesis and contextual understanding, their work forms an important bridge between science and the humanities. For students from either side, it is a means of entry to the 'culture' of science and technology. It introduces science students to documentary sources which are not merely difficult but even contradictory. It also develops the invaluable skill, all too rarely practised in undergraduate science, of constructing a case, either orally or in an essay. It is instructive, for example, to ask science students to argue in detail for phlogiston or against the theory of evolution by natural selection, using evidence available at the time of Lavoisier or Darwin. They quickly find that the issues were not so clear cut as they had imagined and that the 'facts' in each case were coloured by preconceptions and 'external' factors that cannot be separated from the normal pursuit of science.

Undergraduates in the humanities and social sciences, on the other hand, can use the same sources to explore the nature of science and its social and cultural significance (a significance which most undergraduate courses in history shamefully ignore). Even the most sceptical students find excitement in experiencing science through the writings of the great scientists. For the first time, in many cases, they see science for what it is: not the inexorable laying bare of truth by detached technical experts but a faltering human activity with a history as complex as the history of art, literature, or political institutions. Studies of, say, nineteenth-century attitudes to phrenology or the reception of Newtonianism soon dispel naive notions concerning the 'neutrality' of scientific knowledge, thus illustrating many of the issues discussed by philosophers and sociologists.

Conclusion: The above account of science studies is not claimed to be complete or definitive. Scholars and teachers coming from different disciplinary traditions naturally tend to emphasize different aspects, and continue to draw important intellectual support and academic authority from their disciplines. Nevertheless, the convergence, interpenetration and coalescence of these diverse approaches in recent years is striking. A new scholarly community is rapidly developing, with correspondingly interdisciplinary research themes and educational curricula.

Advanced study and research in this field is currently one of the most stimulating and demanding areas of academic endeavour. A number of established subdisciplines are united around a single object of study calling on an unusual diversity of scholarly skills. To contribute to this field, an intimate acquaintance with particular areas of science, technology or medicine must be combined with other skills, such as the ability to sift data and make imaginative use of recalcitrant and diverse sources of information.

The educational significance of Science Studies is as wide and deep as its scholarly concerns. As an element in the training of scientists, engineers and doctors, it ensures that they appreciate the conceptual foundations of both their own disciplines and the ways in which their work interacts with the interests of the wider society. It encourages the ability to present a reasoned case using verbal rather than symbolic modes of argument. Indeed, whether science graduates gain employment in the profession for which their course prepared them, or whether they go immediately or later into more general areas of employment, such as sales or management, science studies must be seen as a vital part of their undergraduate work. But beyond this it can be the integrating theme in courses covering a number of sciences, or sciences and social sciences or humanities. It can provide non-science students with an informed view of the nature of science, technology and medicine and of their cultural and social significance. It can be the means of re-introducing the culture of science to students of limited scientific or technological backgrounds. It can be the crucial factor in allowing the provision of courses with a substantial content of science for students without the normal school leaving qualifications in science.

With proper support, Science Studies can make an important contribution to the creation of a citizenry capable of making the kind of

informed judgements on scientific, technological and medical matters that are essential in a modern science- and technology-based democracy. There is also clear evidence that such studies are of immediate practical benefit to students in their subsequent careers. Unlike students whose training has been narrowly confined to a single traditional academic discipline, students with some experience of Science Studies show a greater willingness to come to grips with the complexities of industrial society, and their career patterns indicate that they are prepared for situations that demand new approaches.

Despite its roots in a number of traditional disciplines, Science Studies is a relatively new area on the academic map, and its significance is often underestimated through ignorance of its contents and capabilities. But its rapid development in recent years and the increasing strength of its scholarly resources show that this is a field of growing intellectual interest and evident educational value. It has reached a level of maturity where it can justly be claimed that courses in this interdisciplinary field should be available to students in all institutions of higher education as major components of their degrees.

BOOK REVIEWS

Charles Webster. *From Paracelsus to Newton. Magic and the Making of Modern Science. The Eddington Memorial Lectures Delivered at Cambridge University November 1980.* Cambridge: Cambridge University Press, 1983. Pp. xii + 107, index, illustrations.

The Eddington Lectures, established in 1947, have as their goal the furtherance of Eddington's search for a fundamental unity underlying divergent scientific, philosophical, and religious methods of seeking truth. Sir Arthur Stanley Eddington, O. M., F. R. S., was Plumian Professor of Astronomy at Cambridge from 1913 to 1944 and famous as an exponent of new developments in astronomy, physics, and cosmology. But he was also a spokesman on religious and ethical questions. It is appropriate that Charles Webster should have been asked to contribute to the series in 1980, for as an historian he has been concerned with the social, religious, and philosophical contexts within which modern science and medicine developed.

In the present volume Webster has deliberately chosen to juxtapose two men usually kept far apart by conventional wisdom--Paracelsus, a Gnostic and Neoplatonic sixteenth-century medical reformer, and Isaac Newton, inventor of the calculus and synthesizer of terrestrial and celestial physics--and to demonstrate elements of continuity between them. By selectively highlighting "modern" elements in Newton and "archaic" elements in Paracelsus, past historians have created an artificially perfect correlation between the decline of magic and the rise of mechanical science, Webster argues, when in fact Paracelsus and Newton were both caught up in remarkably similar religious and philosophical currents.

Both Paracelsus and Newton regarded assurance of personal salvation as their absolute priority. The working out of the nature of humanity's relationship with the creator constituted their primary intellectual mission. Paracelsus contributed to the stream of reformation theology in which Newton was immersed. Among their contemporaries Neoplatonism was as much a vital force in the late seventeenth as in the early sixteenth century. Newton's acculturation occurred in the context of the ascendancy of the Cambridge Platonists. The situation at Cambridge represented a remarkable late echo of the Florentine Platonism of the renaissance, both schools being characterized by an intensity of fidelity to the spirit of ancient theology and philosophy. The self-evident impact of Neoplatonism in England after 1660 should discourage any attempt to describe science at the time of the Royal Society in terms of the unquestioned dominance of the 'mechanical philosophy' (p. 2).

By rehabilitating Paracelsus, who has too long been derogatorily identified with the rejected Renaissance magical tradition, by emphasizing the strong pre-Enlightenment components of Newton's thought, and above all by discussing the persistence of Paracelsian influences, Webster hopes to redress the historical balance between magic and the making of modern science. For that purpose he has chosen three test cases: prophecy, spiritual magic, and demonic magic.

Paracelsus regarded prophecy as the highest form of magic and defined three types: "astronomy," which provided direct clues to the future course of history; magical images and oracles that were infused with

the virtues of the stars and so provided interpretable clues; and the prophecies of Christ himself incorporated in the scriptures. Reference to all three types was necessary for establishing firm prognostications. Prophecy had assumed a terrible significance for Paracelsus and his post-Reformation contemporaries, for it was widely believed that the Reformation had ushered in the last age of the world and that mankind was being prepared for the imminent Day of Judgment. Christian belief had always had an eschatological element, and since the physical and moral worlds of God's creation ran in parallel courses, unusual signs in the heavens that presaged the end also served as warnings to mankind of the need for repentance. Paracelsus made a clear distinction between the normal regularized workings of the cosmos and the special cosmic signs that attend the special interventions of God in history, for example, the Star of Bethlehem.

Just such a distinction continues to be made in the seventeenth century between God's general or ordinary providence and his extraordinary providence. But certain changes in the prophetic tradition do occur. The advent of printing had given the accumulated prophecies of antiquity and the middle ages to a wide public, so that in the Renaissance the emphasis slowly shifted from the framing of new predictions to the interpretation of old ones, both biblical and non-biblical. Paracelsus himself wrote a commentary on the fifteenth-century Prognostication of Johannes Lichtenberger and tried to interpret the so-called Nuremberg figures of Joachimite provenance, as well as devising his own prophetic emblems and writing on the comet of 1531. Later criticisms of judicial astrology and various sceptical attacks notwithstanding, Webster

argues that very few of the traditional sources of prophecy known to Paracelsus had actually fallen out of general use by 1660. On the contrary, Alsted more or less revolutionized the field by fusing and harmonizing two traditional sources, biblical prophecy and astrology. Alsted, a distinguished Calvinist theologian, saw his work published in 1627, as did the Cantabrigian Joseph Mede, whose method of "synchronisms" unified the interpretation of the prophecies of Daniel and Revelation. With Alsted and Mede the interpretation of prophecy gained full academic respectability, passing within two generations to Newton and some early Newtonians.

Webster does certainly establish lines of continuity between Paracelsus and Newton in the interpretation of prophecy. Millennial expectations fluctuate but remain generally high and may even have been higher in Newton's generation than in that of Paracelsus. Knowledge had increased--witness the new science--and the increase of knowledge was itself a sign of the end of days (Daniel 12:4). So was the true interpretation of prophecy, for which Newton thought Mede's method had given the key. Nevertheless, there were subtle differences between Paracelsus and the Newtonians worthy of more exploration than Webster undertakes in this volume: comets, for example, had only a semiotic significance for Paracelsus, but for Newton and Whiston a functional one, serving as agents through which God would destroy, renovate, or restore the earth.

A period of earthly bliss was to be expected either before or after the Last Judgment, during which the adverse effects of the Fall would be reversed and man's dominion over

nature restored. Spiritual magic as revived by the Florentine Neoplatonists offered the magus ways of using the powers of the spiritus mundi that reinforced Christian hopes for restored dominion. Webster treats natural magic as that aspect of spiritual magic "concerned with the interpretation and manipulation of physical phenomena" (p. 71), and he emphasizes the fact that natural magic and experimental science both aspired to the understanding and conquest of the forces associated with spiritual magic. Paracelsus' view of science was firmly rooted in the tradition of spiritual magic, and "the operative side of science involved bringing into action forces derived from the heavens" (p. 57), but he expected success to come to the magus from his own knowledge of and skill in manipulating forces inherent in nature rather than through the activity of celestial "intelligences" or miraculous powers. The "light of nature" that guides man to recover his lost dominion is the same divine light that provides the path to grace and salvation.

Webster finds that ideas about natural magic exist along a continuum. At one end of the spectrum effective operation requires the magus to immerse himself in the harmonies of nature, and natural magicians of that persuasion sometimes became "hypnotized by the possibility of individually attaining universal wisdom" (p. 59)--Postel, Bruno, and John Dee in his later years. At the other end of the spectrum lies the Paracelsian version of natural magic that anticipates a collaborative effort leading toward social amelioration--as with Della Porta, Francis Bacon, and Samuel Hartlib. In the latter tradition the search for effective operation becomes democratized and less esoteric and

is closely tied to the rise of scientific societies which express in an institutional form the ethos of Paracelsian natural magic. The random collections of novelties that constitute the early miscellanies of natural magic are transformed by Bacon into systematic natural histories, and the compiling of Baconian histories becomes a major activity in the early Royal Society.

At the same time systematic compilations of alchemical and cabbalistic literature appear, as well as major expositions of Paracelsian thought, and when the rise of mechanical philosophy seems to threaten a "divorce between God and His universe" (p. 65), there is some recourse to the principles of spiritual magic that seem to offer insight into the divinely ordained, non-mechanistic powers required for the operation of a providential universe. One can find evidence of a non-mechanical metaphysics in many seventeenth-century thinkers, Webster observes: Bacon, Gilbert, Kepler, Harvey, Glisson, and Gassendi. And with the Cambridge Platonists such reservations regarding the mechanical philosophy pass directly to Newton, whose surviving library bears powerful testimony to the intensity with which he studied aspects of Renaissance spiritual magic. Though Webster is cautious on this point, he notes that it has been suggested that Newton's concept of "active principles" derived from such sources and points out that John Webster's Metallographia (1671) may be an especially important work in that regard. Newton's manuscript legacy, which is not surveyed in the volume under review but which has been extensively studied by this reviewer, indicates that Newton's interest in "active principles" began even before John Webster's book was published and was indeed associated with the type of

alchemical literature most closely related to spiritual magic. Influenced by the Cambridge Platonists, Newton sought to understand the non-mechanical principles by which God governed the world. His "active principles" were not mechanistic and they were in some sense divine. Since eventually Newton was to describe the force of gravity as an "active principle," his work brings the tradition of spiritual magic into the very heart of the scientific revolution. Yet, again, one should be aware of distinctions that Webster does not develop. In the case of spiritual magic there are sharp epistemological differences between Paracelsus and Newton. Paracelsus expected the magus to obtain knowledge of natural powers by "overhearing" them with a form of gnostic intuition that by-passes the senses, but Newton--as his meticulous alchemical laboratory record shows--attacked the problem through quantitative experimentation.

There is a strong historiographic tradition that "the ancient shackles of demonology" were broken by the rise of scientific explanation. "The witch-crazed world of Paracelsus seems to be light-years away from the enlightened scepticism of the age of Newton" (p. 75). But even in his final test case of demonic magic Webster is able to establish substantial grounds for revision. Though Paracelsus accepted some parts of traditional demonology, he revised others, and, in drastically extending the scope of naturalistic explanations for diseases, he inevitably narrowed the venue of demonic explanation. On the other hand, Johann Weyer's De praestigiis daemonum (1563), usually treated as a milestone on the road to enlightenment regarding witchcraft, is shown by Webster to be thoroughly anomalous, for in it Weyer accords the widest possible

powers to the Devil. When doubts arose in the seventeenth century regarding the religious acceptability of the mechanical philosophy in its Cartesian and Hobbesian forms, the ability of the new science to explain all phenomena in terms of matter and motion was deliberately downplayed. In the face of alarms over the materialistic tendencies of mechanical philosophy, efforts were made to document the activities of the Devil and his agents "on an unshakable scientific basis" (p. 94), and much of the mid-to-late seventeenth-century literature favorable to witchcraft beliefs came from men firmly associated with the Royal Society.

In conclusion Webster argues that our understanding of the Scientific Revolution is restricted by adherence to a positivistic framework of interpretation. For the sixteenth and seventeenth centuries--an age in which questions of science and religion are inseparable--a close study of prophecy, spiritual magic, and demonic magic is also required. With that conclusion this reviewer is in warm agreement. It is Webster's ability to examine scientific and magical issues in terms of their religious significance that has enabled him to provide so much meaningful evidence of historical continuity between Paracelsus and Newton in this slender volume.

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H. M. Collins and T. J. Pinch. *Frames of Meaning: The Social Construction of Extraordinary Science*. London: Routledge and Kegan Paul, 1982. Pp. x; 204.

Collins and Pinch are well known for their work in the sociology of science. Separately, they have examined knowledge-claims that have been either accepted or rejected in such problem-areas as quantum physics, lasers, and gravity waves. Here together they examine a potential scientific revolution originating in (though reaching far beyond) parapsychology. This is a body of knowledge which is widely, often vehemently, rejected within mainstream science, yet which boasts virtually all of the institutional trappings of established science. The main empirical focus of the book is the psychic spoon-bending claims which mushroomed in the mid 1970s around Uri Geller.

Consistent with now well-established norms in sociology of scientific knowledge, Collins and Pinch adopted an agnostic position with respect to rival beliefs and claims, and took the opportunity to examine the process of knowledge-negotiation as a potential scientific revolution in-the-making. The theoretical justification for this approach derives from what the authors call the 'radical' interpretation of Kuhn, that if one can only expost facto derive any principles of rationality from what comes to be recognized as established knowledge, a major discontinuity in commitment to 'rational knowledge' can and should be studied with an open mind; and the very fact that the issue was (at the time studied at least) still open offered a richer vein of sociological insight than other cases. In the authors' own words:

issues of the 'rationality debate'. The theoretical discussions and resumes of the problem which are found in the philosophy of the social sciences invariably rely for their empirical grounding on one or two classic reports of rituals practiced by primitive tribes. Since this is the first contemporaneous empirical study of a major discontinuity in what counts as rational action, it should fill a gap in the literature.

Although the claim might be open to dispute that this study is the first port of call on the empirical map in the rationality debate after tribal Africa, it can nevertheless be accepted that its approach to paranormal metal bending sheds light upon the social construction of 'orthodox' science too.

After an opening discussion of 'sociocognitive discontinuity' developed from the debate over incommensurability, an argument is advanced that 'unsuccessful revolutions' in science exist and revolutions can be studied in 'real time' without knowing or caring for the outcome. The authors' participation in the potential revolution--they participated in a series of experiments by physicists on children who claimed such paranormal powers--becomes a methodological point of some significance, though it is not really clear how the problem of equal authentic access to the different beliefs and commitments of communities which embody different rational categories is thus solved. Also, if as one could say, there are always potential revolutions in science, what was especially enlightening about spoon bending? Perhaps that it would have been an especially revolutionary revolution? Or that its very elaborateness threw up more empirical materials than most? Or that it was particularly

We address not only the problems of science, but also the wider

accessible?

There then follow several more descriptive chapters, one on the historical context of parapsychology and the Geller phenomenon, and others which lay out the technical content of accepted physical (e.g., quantum theory) and parapsychological beliefs, to demarcate the debate over compatibility and conflict between orthodox and extraordinary science. The main point of this is to demonstrate that established arguments that parapsychology and quantum physics are incompatible, are inconclusive and intrinsically so. This allows the authors to draw in sharper and more symmetrical profile, the social shaping of intellectual commitments one way or the other on this question.

Four chapters then follow devoted to describing and interpreting the paranormal metal bending experiments at Bath University, as technical and social processes. As usual, the empirical fieldwork throws up a host of interesting theoretical questions.

The authors concentrate on the actors' own interpretations and reconstructions of the experiments, seeing them in the process of being embedded in different contexts of taken for granted background knowledge and premises to infuse them with particular 'natural' meanings. They argue that the dynamic interaction between belief, interpretation, and experimental methods can be regarded in Wittgensteinian terms as competing forms of life. Experimental observation, however carefully made, is always ultimately ambiguous and never beyond such forms of life or 'frames of meaning'. Thus even the indications of fraud which are credible as such to those predisposed to believe the world is

'normal,' are only the same in principle as other falsifications and, strictly speaking, inauthenticities which can be found in the emergent successors of scientific revolutions. (Witness Newton's accounts of his discovery with prisms of the heterogeneity of white light.) To those operating within it they thus appear as a natural basis for experimental and maybe theoretical development of that scientific sociocognitive form of life.

As participants and arch-relativists, sociologically speaking, the authors are reflexive enough to be able to describe their own personal normalist commitments, and explain their overall allegiance to the fraud interpretation. But this, as they observe, is essentially separate from their analytical stance. This is neither a debunking of paranormal beliefs, nor of orthodox science. The authors' targets are wider yet. Let them speak their own final thoughts:

Our main theme...perhaps the major problem for the sociology of knowledge is the question of the nature of rationality and the extent to which a universal rationality must be assumed. The answer to this question defines the limits of the sociology of knowledge. One way of approaching this question is to look at the universalistic claims of science. If evidence of radical cultural discontinuities can be found in contemporary science, and that is the claim of this work, then the scope of the sociology of knowledge is very wide indeed.

It may seem a long way from bending spoons to moral philosophy, but that is the implied attempted link. If evidence or logical argument can never settle radical cultural differences within science, how can it be expected to do so in societies

at large? If sociology of scientific knowledge has even modestly helped destroy traditional epistemology and to breathe life into a politically relevant moral philosophy, that is a worthy achievement. Collins and Pinch have added another empirically grounded, theoretically informed and well-constructed study to the field.

However, to enter through the door thus re-opened, sociologists of science might forge more explicit connections with the problems that follow. If univocal rational criteria cannot bridge socio-cultural divides, what then might? Are emotional bonds all we have to rely upon? If so, how are these to be constructively expressed and naturally experienced? Perhaps through the myth of univocal, universal rational criteria, but maybe with reconstructed social reference points?

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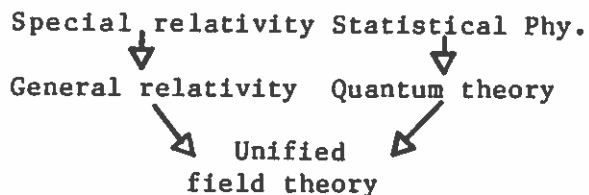
Abraham Pais. 'Subtle is the Lord ...': The Science and the Life of Albert Einstein. New York: Oxford University Press, 1982. ix, 552. illus., notes, appendix, indexes.

Some fourteen years ago, in a foreword to a volume of Historical Studies in the Physical Sciences, its editor at that time, Russell McCormach, set forth promising avenues for historical research centered upon Einstein's scientific career. He suggested (1) that an analysis of Einstein's remarkable personality might be made in terms of the physicist's ability to seize upon tensions within physics and produce from them a new synthesis, (2) that his distance from the professional milieu of physics might be used to examine how his values reacted upon the profession and how he was able to seize upon problems recognized as central within the discipline, (3) that his collaboration with others might prove a fruitful source of investigation, particularly with respect to the relations between the disciplines of mathematics and physics, and (4) that tracing the responses to his ideas among physicists, using the techniques of the sociology of knowledge, might help characterize individual and collective elements in theory conversion. This menu would no doubt appeal to readers of this journal. It does not, unfortunately, characterize the work at hand.

Pais has written a biography of Einstein's scientific ideas, not a biography of Einstein. Despite his personal acquaintance with his subject, he has chosen to take a view of Einstein that is constrained by a physicist's view of the science he produced. Not surprisingly, physicists have hailed the work as a definitive treatment. Those who seek enlightenment about the

philosophical, psychological, and sociological concomitants on that work will, I think, be less enchanted. Some of the flavor of the book can be captured from the preface:

Were I asked for a one-sentence biography of Einstein, I would say, 'He was the freest man I have ever known'. Had I to compose a one-sentence scientific biography of him, I would write, 'Better than anyone before or after him, he knew how to invent invariance principles and to make use of statistical fluctuation'. Were I permitted to use one illustration, I would offer the following drawing:



with the caption, 'The science and the life of Albert Einstein.'

The attentive reader will catch the drift.

Within the limits of a presentist physicists' perspective, Pais paints a detailed and thoughtful portrait around this drawing. Interposing brief non-technical sections on Einstein as a young man, Einstein as a world figure, and Einstein's final decade, Pais fleshes out the major categories he has chosen by tracing the origins of the principal ideas with which Einstein dealt, his transformations and contributions, and developments after Einstein in these fields which he created. In his investigations, he has made use of the Einstein papers as well as Einstein's published work and a number of biographies of the man, but he has not paid much attention to the work of historians of science which have illuminated the issues

with which Einstein was engaged in his time.

For example, rather than dealing with the issue of scientific collaboration through an examination of Einstein's joint efforts with others, he lumps all of his collaborators in an appendix to the book which incorporates brief biographic sketches. Pyenson's¹ studies of some of Einstein's early scientific collaborators reveal the kinds of issues that can be illuminated by a more careful analysis of collaboration: the role of similar intellectual formation, the effects of having been associated with a controversial scientist, and the contributions of the collaborators to Einstein's thought. These are available to Pais, yet he chooses not to use them or to consider the same author's studies of Einstein's scientific education.²

Pais is curiously selective when he does make use of the historical literature. From Klein he takes studies of Boltzmann and Maxwell, but he ignores that scholar's studies of Einstein and Ehrenfest.³ Max Jammer's Philosophy of Quantum Mechanics, but not his Conceptual Development of Quantum Mechanics, are utilized. Russell McCormmach's study of Hertz, but not his studies of Einstein, commend themselves to his attention.⁴ In many cases, these historians have engaged the very issues Pais considers, but they have cast their nets more broadly than he is willing to do. He is fishing for Einstein's scientific ideas and related issues in contemporary physics, not those of his scientific contemporaries. Thus, while his treatment of issues he considers of contemporary moment are intensive and thorough, when he deals with work which he considers "now of historical interest only," like Gustav Mie's filed theory of

electromagnetism (which was the first attempt to create a complete theory of matter in the 20th century), he resorts to dismissal, lists, chronologies and other devices to avoid engaging the issue of its importance in Einstein's milieu.⁵

Pais's ahistorical treatment is reflected in the organization, which, unlike the title, is anything but subtle. Topical sections reflecting the principal subjects (see drawing above) dominate the book, and are only briefly relieved by issues of customary interest to Einstein's biographers. Each section is divided into numbered subsections and, because something of the biographical continuity of Einstein's life and the relationship of one part of his work to the other is sacrificed in this scheme, there are frequent cross-references to other numbered sections. This style, which some physicist-reviewers have found smooth and flowing, is irritating to one who expects the customary prose of the biographer. Only in the last section, on quantum theory, does Pais attempt to bring the issues together. Thus, those who are accustomed to thinking Einstein's invention of the light-quantum as among his earliest contributions will wait until more than half-way through the book to find Pais's consideration of it, although the tension between Einstein's relativity work and his work in quantum theory is alluded to throughout the volume. Promises that the issue will be dealt with in section 26(b) do not relieve the reader's tension.

Needless to say, Einstein's bohemian life in Zurich, his activities as a Zionist, a pacifist, and in opposition to the arms race receive short shrift here. Pais even argues that Einstein's letter to Franklin

Roosevelt was not very important in launching the American quest for the atomic bomb, and, although the argument may have merit, it is not pursued here in enough detail to be convincing. At times, it seems that Pais must diminish the importance of these other activities in order to showcase the scientific work. Thus, he asserts that "Physics remained at the center of Einstein's being in the final decade [of his life]" (p. 474) while admitting two pages later that the hundreds of pages in the book Einstein on Peace "illustrate how much effort Einstein devoted in his last years to issues dealing with the world's future." Of this work, Pais concludes "Some of his suggestions were perhaps unrealistic, other [sic] perhaps premature. Certain it is, though, that they originated from a clear mind and strong moral convictions." (p. 476)

These "issues relating to the world's future" and "suggestions" are, of course, dealt with at length in other biographies of Einstein, and it would be unfair to tax Pais with writing the book he is best qualified to write: an account of the development of Einstein's scientific ideas from the perspective of contemporary physics. The value of this work will be apparent to any who have tried to comprehend Einstein's work as translated by those incompetent to popularize or to analyze it. Pais's appreciation of the content of Einstein's oeuvre is evident in his unwillingness to water down very technical issues. Short of examining the original papers, his book is the clearest exposition of Einstein's ideas one is likely to find. It demands of the reader the knowledge and the fortitude to follow Einstein into the complexities of general relativity, specific heats, quantum statistics, and other subjects usually skirted

by Einstein's biographers. For those who have both, the excursion will be a rewarding one.

Notes

1. L. Pyenson, "Einstein's Early Scientific Collaboration," Historical Studies in the Physical Sciences [HSPS] 7 (1976), 83.
2. Pyenson, "Einstein's education: Mathematics and the laws of nature," Isis 71 (1980), 399.
3. Martin Klein, "The First Phase of the Bohr-Einstein Dialogue," HSPS 2 (1970), 1; "Einstein's First Paper on Quanta," The Natural Philosopher 2 (1963), 57; "Thermodynamics in Einstein's Thought," Science 157 (1967) 509; "Einstein and the Wave-Particle Duality," The Natural Philosopher 3 (1964), 1; Paul Ehrenfest The Making of a Theoretical Physicist (New York: American Elsevier, 1970).
4. Russell McCormmach, "Einstein, Lorentz, and the Electron Theory," HSPS 2 (1970), 41.
5. See page 257. Cf. Jagdish Mehra, "Gustav Mie," Dictionary of Scientific Biography IX (New York: Charles Scribner's Sons, 1974), 376-377.

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Anthony M. Stranges. Electrons and Valence: Development of the Theory, 1900-1925. College Station: Texas A&M University Press, 1982. xii + 291pp., bibl., index.

Anthony Stranges has written an important book about the development of valence and bonding theory in the first quarter of the twentieth century. In eight densely packed chapters, Stranges takes the reader from the electrochemical bond of the early nineteenth century and its failure to satisfy the needs of organic chemists, through the development of G. N. Lewis' bonding theory in the period from 1916 to 1923. Although Lewis' theory has had a mathematical foundation built under it since it was first proposed (Stranges covers a little of this in a short epilogue), it is his original theory, with only slight modifications, that is used by nearly all chemists today.

The introductory chapter reviews the nineteenth century theories of bonding, valence and molecular structure. It ends with Thomson's discovery of the electron in 1847 which leads, quite naturally, into the development of modern theory of bonding. Chapter 2 details Thomson's theories of atomic structure, his early difficulties with mass and charge and the solutions offered by Rutherford's nuclear atom. This chapter also reviews Thomson's electrostatic theory of valence.

At the turn of the century chemistry was still a very empirical science and the physicists view of the atom and bonding was too mathematical for most chemists. Chemists were primarily interested in a theory that would explain the structure, and the physical and chemical properties of molecules. Thomson's electrostatic theory offered some promise in this direction and was

taken up, in one form or another, by a number of chemists. Chapter 3 deals with the reaction and response of chemists to the discovery of the electron and the various valence theories advanced before 1910.

Chapter 4 and 5 contain an excellent account of the efforts of American chemists George Falk, John Nelson, Hal Beans, W. A. Noyes, Harry Fry and Julius Stieglitz, to adapt electrostatic or polar theory of valence to the needs of chemists, in particular organic chemists. The similarities and differences in approach are covered in detail. These polar theories, however, had difficulties in accounting for the properties of non-polar (organic) molecules and for the bonding in Werner complexes. They also predicted the existence of electromers, i.e., electronic isomers, which proved impossible to isolate.

In 1913, W. C. Bray and G. E. K. Branch, two of G. N. Lewis' colleagues at Berkeley, in recognition of the limitations of the polar theory, proposed that there were, indeed, two types of bonds, polar and non-polar. This dualistic theory of valence received support from Lewis and from J. J. Thomson, who was fast becoming convinced of the inadequacies of the unitary theory he had fathered. These developments, and the valence theories of William Arsem and Johannes Stark which in some ways bridged the gap between the unitary and dualistic theories of valence, are described in Chapter 6. This sets the stage for the unveiling of Lewis' shared electron pair bond, which was the culmination of a century of speculation, theorizing and experimentation by chemists and physicists.

The final two chapters cover Lewis' bonding theory. In the only

extended biographical treatment in the book, Stranges spends a page on Lewis' education and early career. The focus in these chapters is primarily on the shared electron pair bond, the real cornerstone of Lewis' theory. First, Lewis' earliest proposal (1961), based on the cubic atom, is described in detail. This is followed by a discussion of the shortcomings of the cubic atom and the modifications that were necessary to remedy its deficiencies. The development of atomic theory based on the work of Rutherford, Moseley, Bohr and others during this period is described in order to provide some scientific context for Lewis' proposals. Finally Stranges reviews the reconciliation of the physical and chemical models of the atom, and the general acceptance of Lewis' model by the greater chemical community.

Electrons and Valence is a valiant attempt to cover an extremely complex development in science in a very limited space. It is a workman like review of the early 20th century literature of atomic structure and bonding. Historians of chemistry will appreciate the broad overview and the extensive bibliography it provides. The book should inspire others to study, in greater depth, many of the problems Stranges has outlined.

The book is not always easy to read and, in several instances, Stranges adds needless mathematical detail which makes negotiating the text even more difficult. The mathematics is not difficult, but digging through it, even in a cursory fashion, slows down the flow of history. The ideas get lost in the details. One or more appendices would have been preferable.

This book is a must for the bookshelf of the serious historian of chemistry. It will also be of

considerable interest to most chemists with any historical curiosity. It is, however, not for the sociologist of science. The scientific debates are clearly drawn, but the scientists themselves have almost no history, but it comes close. For those teaching a course in historiography, the final two chapters can be nicely contrasted with Robert Kohler's articles covering much the same ground.¹

Note

1. R. E. Kohler, Jr., Historical Studies in the Physical Sciences, 3 (1971), 343; 4 (1975), 39; 6 (1975), 431.

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Be sure to see the following
in this issue:

4S Individual Memberships Dues Form

Registration form for 9th Annual Meetings
page 42

Hotel Reservation Form for 9th Annual Meeting
page 42

NOMINATING COMMITTEE REPORT

CANDIDATE PROFILES

The following candidate profiles were solicited from candidates for Council of 4S, and are listed alphabetically. The election will be held by mail ballot soon.

Ruth Schwartz Cowan

BIOGRAPHY: Associate Professor of History at the State University of New York at Stony Brook. Trained as an historian of science I have also developed an interest in the history of technology, in which field I have recently published More Work for Mother: The Ironies of Household Technology from the Open Hearth to the Microwave.

GOALS FOR 4S: I believe that historians have much to contribute to and learn from the work of 4S and if elected will take the integration of history and historians into the Society as a principal responsibility.

Marc De Mey

BIOGRAPHY: Marc De Mey received his doctoral degree from the University of Ghent in 1970 (psychology) where he worked with the logician and long time collaborator of Piaget: Leo Apostel. This provided him with a Piagetian bias in science studies. He also worked with J. S. Bruner at Harvard's Center for Cognitive Studies and specialized in the application of cognitive psychology and cognitive science concepts to the study of scientific knowledge. His 1982 book "The Cognitive Paradigm" (first volume in Reidel's series "Sociology of the Sciences Monographs" now also available in paperback) indicates the kind of approach he has developed while teaching science studies in the Netherlands at the departments of psychology and sociology of the University of Tilburg (1973-78) and Belgium, where he is currently faculty associate at the University of Ghent. Invited by the Fudan University of Shanghai to lecture on these topics this spring, he will also visit the Chinese Association for Science of Science headquarters in Peking. He is also in charge of local arrangements for the forthcoming integrated annual meetings with EASST and C&C.

GOALS FOR 4S: The pioneering efforts of sociology of science in recent decades have relativized the monopoly that philosophy of science tended to develop in science studies after the second world war. Sociology of science has illustrated the viability and necessity of complementary approaches which combine the various disciplines and subdisciplines studying the structure and organization of scientific knowledge. I would try to promote further integration of relevant areas which would enhance the chances for developing a genuine science of science. In particular, I would support and contribute to intensify relations with cognitive science which is currently developing along with attempts to industrialize the utilization of knowledge by means of artificial intelligence findings. These attempts to offer challenges in terms of new theoretical concepts to deal with knowledge and practical policies to accompany the computerization of the utilization of scientific knowledge. Within the cognitive analysis of scientific knowledge production, I would also attempt to include cross cultural comparison, in particular selected parts of Western science and Chinese science, eventually in cooperation with the Chinese

Association for Science of Science and Science Policy Studies with whom I would propose to intensify relationships in general.

Belver C. Griffith

BIOGRAPHY: After several years of work in psycholinguistics and on cognition in retarded subjects, he co-directed with William Garvey the Project on Scientific Information Exchange in Psychology, resulting in a model for information processing by scientific disciplines. In 1969 he became Professor, College of Information Studies, Drexel University. His recent work has focussed on the structure of scientific literatures and the evaluation of large information systems.

GOALS FOR 4S: The 4S should have three goals: (1) improving communication among scholars (2) linking scholars and policy makers dealing with science, technology and social impacts; and (3) integrating diverse national and ideological views of science and technology. Accordingly the Governance of the Society must strike a necessarily difficult balance between a concern with quality and with insuring that no point of view is inappropriately advanced or neglected.

David L. Hull

BIOGRAPHY: Received a Ph.D. in History and Philosophy of Science from Indiana University in 1964. He then taught in the Department of Philosophy at the University of Wisconsin-Milwaukee; currently at Northwestern University. He has published in taxonomic philosophy, history of science and philosophy of science. His two books include Darwin and His Critics (Harvard, 1973) and The Philosophy of the Biological Science (Prentice-Hall, 1974). He is currently working in a book setting out an evolutionary analysis of science as a social process. He has been most active in the Society of Systematic Zoology (currently President), the Philosophy of Science Association (currently President-elect) and the AAAS (currently Secretary of Section L).

GOALS FOR 4S: To increase productive exchanges and cooperation with related disciplines such as history of science and philosophy of science. To increase funding from agencies such as the National Science Foundation for proposals that include usage of the techniques developed by sociologists of science. To survive 4S must increase its membership if not among sociologists, then among philosophers and historians. The sorts of papers written by all three groups overlap extensively. These three societies already cooperate to some extent. This cooperation should be continued as being mutually beneficial for everyone concerned.

Marcel Chotkowski La Follette

BIOGRAPHY: During 1984-1985, I will be a Congressional Fellow in the Office of Technology Assessment. My education was in physics (B.S., 1967, Little Rock University), science journalism (M.S., 1968, Boston University), and mass communications (Ph.D., 1979, Indiana University). My research interests include public attitudes to science and technology, values questions for regulatory policy making, and how research fraud affects the scientific journal system. I have taught at Indiana University and MIT and am the Editor of Science, Technology and Human Values. My publications include Creationism, Science, and the Law: The Arkansas Case (MIT Press, 1983) and Quality in Science (MIT Press, 1982). I have been a member of 4S since its founding.

GOALS FOR 4S: (1) To strengthen the organization as an international and interdisciplinary meeting-place for the exchange of ideas and for the encouragement of cooperative research projects; (2) to accomplish these goals through annual meetings, a strong coordinating publication, and regional workshop-style meetings directed toward interdisciplinary discussion of scientific social problems or issues; (3) to encourage and develop support for educational efforts in areas relating to 4S, through vigorous recruitment of new student members, sponsorship of educational exchanges, and formal society support for proposals to fund graduate fellowship and research aid; and (4) to strengthen the ties of 4S with its counterpart organizations, such as EASST, and with colleagues in, especially, Asia, the Central and Southern Americas, and underdeveloped nations.

Bruno Latour

BIOGRAPHY: Born in 1947 in France Bruno Latour has been educated in philosophy, biblical exegesis and sociology. After sociological work in Africa, he has studied for two years a biological laboratory in California. He published a book with Steve Woolgar, Laboratory Life: The Social Construction of Scientific Facts. Back in France he teaches in the STS center at CNAM and is currently at Ecole Nationale Supérieure des Mines de Paris. He just completed a five year study of Pasteur and the French society and a book, Les Microbes: Guerre et Paix. His main interest is to develop a coherent framework for the STS field, and to see what transformations social sciences should undergo to understand science and technology. He is presently writing a primer in STS. Founder and editor of the bulletin, Pandore he teaches every two years a term at University of California San Diego.

Thomas Nickles

BIOGRAPHY: B.A. and B.S. degrees in Philosophy and Mathematics, University of Illinois, 1965; Ph.D. in Philosophy (Program in History and Philosophy of Science), Princeton University, 1969. Postdoctoral fellowship at Center for Philosophy of Science, University of Pittsburgh, 1982-83. Taught at the University of Illinois, Urbana, and the University of Chicago (as Visiting Assistant Professor) before moving to the University of Nevada, Reno, where he is now Professor of Philosophy. About 35 publications in Philosophy and History of Science, including two edited volumes in Reidel's Boston Studies series: Scientific Discovery, Logic and Rationality and Scientific Discovery: Case Studies (both 1980). Program Chair of 1982 Philosophy of Science Association Meetings (Philadelphia) and co-editor of PSA 1982, 2 vols.; member, 1983 4S Program Committee and Editorial Board of 4S Review. Current interests are in scientific "discovery," problem solving and heuristics; in history of methodology; and in socially informed theory of inquiry.

GOALS FOR 4S: I want the Society to continue to mature into a more professional society in some respects, including the transformation of the 4S Review into a full-fledged journal. But I do not want 4S to become professional in the sense of becoming conservative and closed to new ideas and to new disciplinary mixes. Just as it provided an open, critical forum for the sometimes radical ideas of the 1970's, the society must remain open to the new and perhaps strange ideas of the 1980's--and open to "good old" ideas as well. The active international dialogue which 4S fosters is a fine thing which must be nurtured, e.g., by continuing to schedule meetings in Europe periodically, by keeping the membership informed of work in progress on both sides of the Atlantic (and elsewhere), and by encouraging the exchange of working drafts of papers.

Steven Shapin

BIOGRAPHY: Steven Shapin has been lecturer in social history of science at the Science Studies Unit, Edinburgh University since 1973. He trained in biology and genetics at Reed College and at the University of Wisconsin, then took a Ph.D. in the history and sociology of science at the University of Pennsylvania. He has published extensively on the social organization and social uses of science in Britain from the 17th to the 19th centuries. His work includes studies of scientific societies, popular education in science, the social uses of ideas of nature in 17th and 18th century Britain. He is currently completing a book (with Simon Schaffer) on the Hobbes-Boyle controversies over the value of experiment in science. All his work has been concerned to explore the scope of the sociology of knowledge in empirical history of science.

GOALS FOR 4S: He would like to encourage the Society in two enterprises on which it has already embarked. Firstly, he wishes to extend the links already partly put in place between the sociology of knowledge and the practice of history of science. Bridges between the two disciplines can best be built and maintained by greater stress on 'middle-level' theoretical perspectives, and he would like to see meetings and the Review reflect this rather more. Secondly, he wishes to see greater effort devoted to recognizing the existence of divergent national traditions in the social study of science. Such traditions should not, and cannot, be overcome, but the Society ought to work vigorously to facilitate effective communication between them.

John Wilkes

BIOGRAPHY: John Wilkes began his studies of the sociology of science at Cornell with his dissertation research on "Cognitive and Research Styles in Science..." completed in 1976. This was a comparative study of four disciplines that established his interest in scientific creativity, career choice and the emerging social-psychology of science. Soon afterward, he broadened his interest to encompass technology--society interactions and has researched the nuclear debate (particularly the role of "knowledge" and media coverage in public formation of attitudes about this technology), the impact of Three Mile Island on Nuclear Opinion, NASA's clash with the space scientists over the role of computers in the space program, and the "hacker" debate in computer science. His continuing interest in the problems besetting "technology assessment" were expressed recently in an essay review on the value of case studies in this field.

He, his colleagues and his student assistants have also tackled a series of projects on the reception of innovation among established scientists and neophyte engineers, the relationship between Right and Left Brain thinking and existing measures of creativity and cognitive style, the challenge of managing R and D labs, criteria used by different types of researchers in peer review, career choice and research behavior among academic scientists and, most recently, the experience of women in science (considered from a cognitive styles perspective). Potential connection between cognitive style and learning styles as they effect technical education are the next issues on his agenda.

In addition to reporting on this research, he has also published papers describing courses designed specifically around Policy and S-T Case Studies to introduce engineering students to the social sciences. His research has been supported by an ASEE-NASA fellowship, an NSF grant and two smaller grants from private sources and contributions from the Public Affairs Research Center based at Clark University in Worcester, Massachusetts.

GOALS FOR 4S: At the time of the founding of the 4S, the hope was that it would become a dominant international forum for interdisciplinary debate about the nature and social implications of science. Later a vital interest in science policy and technology studies was added to that agenda. I feel that the 4S still has that potential and should strive to achieve it.

This means that renewed effort must be made to enrich and diversify the membership over the next few years. Several significant and relevant traditions of scholarship are still seriously underrepresented in the 4S; and the more we branch into technology and policy studies, the more serious these lapses will become.

Five years ago I led a largely successful membership drive to bring psychology into the 4S because I was concerned about the growing number of cognitive issues arising out of the ongoing debates in the sociology, history and philosophy of science. Their participation has brought about a useful intellectual ferment and those of us interested in the social-psychology of science are slowly learning from one another across the divide of disciplinary perspectives.

It is now time to reach out again, this time more boldly. The occasions in which we confront the experience and interpretation of practicing, socially concerned scientists and technologists by seeking them out and inviting their participation are still all too rare. Those concerned about the politics of nuclear power and the problems of technical education are particularly likely to respond to a call at this time and challenge our thinking. Cross fertilization of our policy studies with more of the interested economists, political scientists and patent lawyers is also long overdue. The 4S should also be thinking about how to preserve key sets of related papers on given subjects in a form accessible enough for classroom use, evaluating media and film treatments of the types of incidents we tend to study, and developing a mechanism to facilitate cooperation and interaction among members between meetings. Regional seminar circuits, exchange programs, data archiving and a clearinghouse for unusual research opportunities all deserve discussion as we consider how to foster and develop the field and broaden the 4S.

Robert R. Wright

BIOGRAPHY: His major contribution to the social studies of science is leadership of the Science Indicators activities of the National Science Board. For the last ten years, he has been in charge of these reports and the development and stimulation of the research base underlying them. His substantive areas of interest are bibliometrics and public attitudes toward science and technology. He spent part of 1983 as a Legislative Fellow in a Congressman's office, active in science policy matters. From 1966-74, he directed the Central Staff Office of Institutional Research of the SUNY System, where he developed a number of information systems in support of SUNY planning and administrative operations. From 1961-66, he held administrative positions at Wayne State University and became Associate Professor of Educational Sociology in 1965. He taught graduate courses in multivariate analysis and research design in the social sciences. His Ed.D. was in the field of mental retardation (1964).

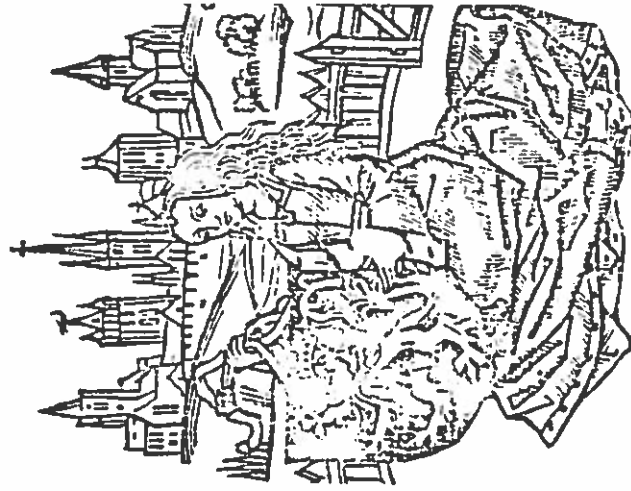
GOALS FOR 4S: The greatest value of 4S to me has been the professional stimulation of the disciplines it represents. I see a great need of my colleagues in the analysis of the science and technology enterprise for a better understanding of the methodologies of the 4S community and its substantive knowledge. 4S can also help the traditional scholars to see the importance of bringing their work to bear on the contemporary issues which face the policy-maker. Therefore, I believe that 4S should provide much greater opportunity at its meetings for the confrontation of disciplines and occupations concerned with science and its study. Specifically, we could have more sessions approaching a problem by several disciplines. We could also have book reviews and summarizing essays run head-to-head by assigning them intentionally to proponents of competing approaches. 4S should try to stimulate individual efforts to bridge the specialization gap that such interdisciplinary organizations face.

George Sarton Centennial

University of Ghent Belgium

BLANDIJNBERG 2, B-9000 GENT

14-17 November 1984



COMMUNICATION & COGNITION
EUROPEAN ASSOCIATION FOR THE STUDY OF SCIENCE
AND TECHNOLOGY
SOCIETY FOR SOCIAL STUDIES OF SCIENCE

The 9th Annual Meeting of the Society for Social Studies of Science (4S), the 3rd Annual Meeting of the European Association for the Study of Science and Technology (EASST), and Communication & Cognition's (C84) are integrated into a George Sarton Centennial celebration organized at the University of Ghent.

Location

Ghent (spelled "Gent") in Dutch and called "Gand" in French) is a historic city in the Dutch (Flemish) speaking part of Belgium. It is 55 kilometers from the capital Brussels, in between this city and well known touristic centers such as Bruges or Ostend on the coast. Together with Antwerp, which is also within easy reach (55 kilometers), Ghent and Bruges constitute splendid cultural areas with many interesting buildings and museums.

The meetings are being held at the university of Ghent, which was established in 1817 under the Dutch government of Willem I. While it has no integrated campus, it has recently acquired an old abbey-building called the "Pand" which is currently being transformed into the university's cultural center. During the 16th century religious wars, this building harbored a Calvinistic university (1578-1584). Around 1900 was the abbey segmented and available for rent and as a student Sarton had a study here.

The "Pand" will provide meeting-rooms and dining facilities. As the building is located in the center of the city, there are also many restaurants within easy walking distance. The address of the "Pand" is:

Het Pand
Onderbergen 1
9000 Gent.

← Cover illustration: Woodcut of around 1511 in a book of Erasmus "Concio de puero lesu", produced by Robert de Keyser, a printer in Ghent. The picture indicating the virgin of Ghent against the skyline of the city is also one of the first images in a picture book on Ghent donated to the "Museum voor de Geschiedenis van de Wetenschappen" by George Sarton. It had been the very first book Sarton bought at the age of ten.

Communication & Cognition (C&C) is an international association founded in 1967 at the University of Ghent to promote the interdisciplinary study of cognitive and communicative processes. Special attention is paid to scientific knowledge and epistemological issues. A subdivision of C&C is now focusing on Artificial Intelligence. The society combines sociological, historical, logical, linguistic and psychological approaches with studies in the philosophy of science and of the dynamics of scientific development. C&C publishes a journal with the same name as well as several series related to its interests. Its current president is Fernand Vandamme. C&C is the host society for the George Sarton Centennial.

The European Association for the Study of Science and Technology (EASST) was founded in 1981 to stimulate communication, exchange and collaboration in the field of studies of science and technology in Europe. One reason for establishing an interdisciplinary scholarly society has been the merging of history, sociology and psychology of science in recent years. Another reason is the importance of connecting these perspectives with economics and political and policy studies of science and technology. Thus cross-disciplinary interaction, and cross-fertilization between humanistic and policy-oriented studies in the field are important aims. EASST publishes a quarterly newsletter. The current president is John Ziman.

The Society for Social Studies of Science (4S) was founded in 1975 to facilitate interdisciplinary communication among people with an interest in the social studies of science and technology. It has over 400 members in 34 countries, whose disciplines include anthropology, economics, history, information science, philosophy, political science, psychology, research administration, science policy studies, sociology, and the natural and engineering sciences. 4S sponsors the John Desmond Bernal Award for distinguished contributions to the social studies of science. Made possible by the generosity of the Institute for Scientific Information, the award includes a cash award of \$1,000, and was presented in 1981 to the late Derek de Solla Price, in 1982 to Robert Merton and in 1983 to Thomas Kuhn. 4S publishes a quarterly journal. The current president is Nicholas C. Mullins.

GEORGE SARTON

George Sarton was a Ghent born (1884) scientist who has founded ISIS in 1912 as the international journal devoted to the history of science and its cultural influences.

On the occasion of the centennial of his birth, the university of Ghent where Sarton started his higher education in 1902 is an appropriate place to commemorate a pioneer in the interdisciplinary study of science and its social impact. Sarton obtained a Ph.D. in mathematics and physics in 1911 with a thesis on "Les principes de la mécanique de Newton" after having won a national medal for promising work in chemistry in 1908. Originally however, he had started out as a student in philosophy, preoccupied as a well to do young man with education and moral elevation of the poor working class. This preoccupation remained manifest throughout his studies in chemistry, physics and mathematics through his participation in various student bodies (some of which he helped to found, such as "Reiner Leven") and through literary works ("Une vie de poète", 1905 and "La chaîne d'or", 1909 published under the name Dominique de Bray). After having obtained his degree he founded ISIS in order to create a journal devoted to the study of scientific development which, according to him, expressed the only genuine mechanism of progress, of society as well as of the intellect. The editorial policy announced in the first issues of ISIS is very interdisciplinary and in some aspects quite comparable to aims and ambitions formulated at the foundation of C&C, 4S, and EASST. ISIS was called a journal devoted to both the history and the organisation of science. It was meant to be "the philosophical review of scientists or the scientific review of philosophers; the historical review of scientists or the scientific review of historians; the sociological review of scientists or the scientific review of sociologists".

The success of his efforts jeopardized by World War I, Sarton moved to the U.S. where, in 1924, the History of Science Society was founded to secure the future of ISIS. On two previous occasions (Toronto 1980 and Philadelphia 1982) 4S, the Philosophy of Science Association and the Society for the History of Technology have held joint meetings with the Society that continues to foster interest in the history of science and its social and cultural relations in Sarton's spirit. Sarton himself, after various affiliations with Harvard extending over many years, finally became the first history of science professor at that university and played a major role in the social network that also was to know

R.K. Merton, J.B. Conant, I.B. Cohen, T.S. Kuhn and many other important contributors to current sciences of science.

However, the intricate social network in which Professor Merton locates in "The Sociology of Science: An Episodic Memoir" (in Merton, R.K. and Gaston, J. eds., *The Sociology of Science in Europe*, Southern Illinois University Press, Carbondale, 1977, pp. 3-141) Sartori's American influence and impact is not typical of Sartori's Cambridge period only. In Ghent too, and possibly even more than at Harvard, Sartori connected to individuals and groups whose goals and ideals he helped to shape and made his own as well. The fact that ambitions, similar to Sartori's ideas for an Institute for the Study of History of Science have been taken up again, obviously in adapted form and taking into account developments in several fields, indicates that he is not an isolated figure. It is the same Genthian spirit that inspired Leo Apostel's proposal for a Center for Interdisciplinary Studies of Science (Apostel, L., "A Center for Interdisciplinary Synthesis" in Apostel, Berger, Briggs and Michaud, "Interdisciplinary, Problems of Teaching and Research in Universities", OECD, 1972, pp. 261-277) and that continues to exist, on a modest scale, in Communication and Cognition.

PROGRAM

The bulk of the program consists of invited and contributed papers by members of the organizing societies, reflecting current concerns and research topics within the general area of science studies. Special symposia and sessions are listed in the detailed program below. Specific events commemorating George Sartori and Ghent are the opening reception on Wednesday night, November 14th, the plenary opening session on Thursday morning, November 15th; and the theatre performance "Na '84" ("After '84") on Thursday evening.

Discussion sessions

In addition to parallel sessions grouped under the labels 'Cognitive Studies and Scientific Practices', 'Structures and Developments of Sciences', 'Sciences, Policies and Practicalities', and 'Technology and Public Issues of Science and Technology', the program includes discussion sessions with posters and/or short

presentations. The latter require the preparation of text and illustrative materials readable from a distance of 3 to 4 feet and appropriate handouts.

Audiovisual equipment

Participants are encouraged to utilize handouts rather than slides. If the use of audiovisual equipment is necessary, an overhead projector for transparencies will be made available. Participants should notify the program committee in advance when they need this equipment.

Publishers' and booksellers' display

C&C will organize a book and publication display. Authors (of their publishers) who want to use this facility can send requests for display space to Jean De Man, C&C, Blandijnberg 2, 9000 Gent.

Extended abstracts

A volume of extended abstracts of the presentations will be published. Instructions concerning the format of abstracts will be communicated to contributors not later than July. The summaries, to be sent to the Ghent Program Committee, are due by September 15th.

Provisional Program

Situation as of May 30th, 1984. The definitive program will be handed out at the registration desk.

SESSIONS ON COGNITIVE STUDIES AND SCIENTIFIC PRACTICES

Is Science Constructed ? (Chair : Steve Woolgar) (Thursday 15 afternoon)

Ronald N. GIERE, Realism in the Laboratory
Bruno LATOUR, Can Anthropology of Science Be Taken Seriously ?
Greg MYERS, The Social Construction of Two Biology Articles
Paul TIBBETTS & Patricia JOHNSON, The Discourse and Praxis Models in Recent Reconstructions of Scientific Knowledge Generation
David TURNBULL, Hoaxing, Forging, Trimming and Cooking : Fraud in Science as a Problem for the Sociology of Knowledge

Scientific Practices (Chair : Harry Collins) (Friday 16 morning)

William E. FEINBERG, The Human Construction of Sampling Distributions and the Development of Modern Statistics
Fernando GIL, Controversies and Innovation
Michael LYNCH, Situated Aspects of Experimentation
Benjamin MATALON, Les pratiques de vérification des expériences scientifiques
Trevor PINCH, Towards an Analysis of Scientific Observation : The Externality and Evidential Significance of Observational Reports in Physics
Martin J.S. RUDWICK, The Historical Analysis of Scientific Research Practice
Steven YEARLEY, The Dictates of Method and Policy : Vocabularies of Choice in Scientific Work
Sjerp ZELDENRUST, Research Goals and (Inter)Organizational Context

Cognitive Studies — Opening Session (Chair : Henry Small) (Thursday 15 afternoon)

Howard GRUBER, Cognitive Science and Psychology of Creative Thinking in Science
Marc DE MEY, Cognitive Science and Integrated Science of Science
Arthur I. MILLER, History of Science as a Laboratory for Cognitive Science
Ryan TWENEY, Empirical Psychological Investigation of Scientific Cognition

Cognitive Studies I (Chair : Dirk Vervenne) (Friday 16 afternoon)

Leo APOSTEL, An Unknown Piaget : From the Theory of Exchange and Communication to the Theory of Knowledge
A. FALKOWSKI, Cognitive Psychology and the Growth of scientific Knowledge
Rudolf FISCH & Hans-Dieter DANIEL, Patterns of Work Cooperation and the Performance and Satisfaction of Research Units
Mariane HEDEGAARD & Yrjö ENGESTROM, A Cultural-Historical Approach to the Development of Thinking
Robert MAIER, Cognitive Development as Auto-Organisation. Answers and Questions.
Henry SMALL, Co-citation Maps of the Natural and Social Sciences : Their Interpretation as Cognitive Maps.
Fernand VANDAMME, Cognitive Studies and Applied Epistemology.

Cognitive Studies II (Chair : Marc De Mey) (Saturday 17 morning)

Samuel EDGERTON, The Relation between Representation in Art and Science
Dedre GENTNER, Dynamics of Cognitive Systems
Albrecht HEEFFER, Cognitive Structure and Laboratory Studies I
Andrea DI SESSA, 'The Translation from Naive to Expert Physics'
Dirk VERVENNE & Dani DE WAELE, Cognitive Structure and Laboratory Studies II
Dani DE WAELE, Scientific Behavior : Some Contradictions and Possible Implications

Cognitive Studies III (Chair : Arthur Miller) (Saturday 17 afternoon)

Michel CALLON, The Cycle of Translation
Susan E. COZZENS, Sedimentation and Normative Integration : Evidence from the Opiate Receptor Case
Ellsworth R. FUHRMAN & Erkki KAUKONEN, On the Circulation and Legitimation of Scientific Knowledge : The Case of Sociology in Finland
Hans HARBERS & Gerard DE VRIES, Sociology of Social Sciences and Society : Constructivism versus Fleck
Andrew JAMISON, A Comparative Social Theory of Science

SESSIONS ON STRUCTURES AND DEVELOPMENTS OF SCIENCES

Birth of Modern Science

(Thursday 15 afternoon)

A. Muslim Medieval Science, Averroism, and the Birth of Modern Science
(Chair : Hosam Elkhadem)

A.-C. DERO, Les funérailles mythiques d'Averroës

Yvonne DOLD-SAMPSON, Al-Kasbi and Algebraic Equations
Hosam ELKHADAM, The Place of the History of Muslim Medieval Science in the Writings of George Sarton

B. Alchemy, Astrology, and Modern Science

(Chair : Gérard Simon)

Gad FREUDENTHAL, Electricity in the Seventeenth and Early Eighteenth Centuries : Alchemy in Atomism

Joost VANHOVE, Astrology and Modern Holistic Linguistics

Frank VERMEIRSCH, Alchemy and Psychiatry

Jean-Michel VIENNE, De l'alchimie à la science via la scolastique : la notion de qualité chez les auteurs du XVII^e anglais

Sociology of Mathematics (Chair : Sal Restivo)

(Friday 16 9.00 a.m.)

Herbert MEHRTENS, Mathematics in the Third Reich : Structures of Disciplinary Politics

H. Gil PEACH, Social Relations in the Production of Applied Social Statistics
Sal RESTIVO, Foundations of Mathematics in Sociological Perspective

Social System of Engineering (Chair : Michel Callon)

(Friday 16 10.45 a.m.)

John D. HOLMFELD, The Guild and the Invisible College : Toward a Sociology of Engineering

K.M. OCHS, A Statistical Study of Colorado School of Mines

Knut H. SPØRSEN, Deconstruction of Systems Analysis

SESSIONS ON SCIENCES, POLICIES, AND PRACTICALITIES

Evaluating Priorities in Science (Chair : Otto Larsen)

(Thursday 15 afternoon)

Gérard DARMON, The Study of Decision in Big Science : The Case of the French-German Institute of Radioastronomy in Millimetric Waves
John IRVINE & Ben MARTIN, Research Evaluation - Why ? How ?

Chunglin KWA, The Selling of a Program : Ecology's Step into Big Science
John LANKFORD, Private Sector Priorities and the Stimulation of Research :

The J. Lawrence Smith Fund of the National Academy of Sciences for Research in Meteoritics, 1884-1940

James L. MCCARTNEY, Setting Priorities in Science : Toward a Model of Power and the Negotiation of Research Priorities

Viviane THEVENIN, Programme Evaluation and Budgeting for R & D : A Comparative Overview of France, Britain, Germany, Japan and the United States

Perspectives on Cognitive Authority in the Sciences (Chair : Richard Whitley)

(Friday 16 morning)

Richard BURIAN, Internal Politics and Theory Justification

Thomas F. GILRYN, Authority in Science/Authority of Science : The Ambivalent Response of Scientists to Their Popularization

Girolamo RAMUNNI, How Science, Cultural and Political Options Enter in the Choice of Nobel Laureates

Stephen STRAKER, 'The Supervision of Orthodoxy' : Science and Cognitive Authority in the Scientific Revolution

Sociology of Medical Science and Medical Practice

(Friday 16 afternoon)

Kathryn S. ARNOW, The Controlled Clinical Trial : A Pattern of Exchange
Stuart S. BLUME, Texts and Contexts of Medical Science

Darleen FISHER, Constructed Worlds in the Leukemia Clinic

Peter GROENEWEGEN, Problem-oriented Research a Basis for Disciplinary Development ?

Anja HIDDINGA, The Emergence of Obstetrics as a Medical Discipline

Anna WYNNE, Accounting for Accounts of the Diagnosis of Multiple Sclerosis

Social Sciences as a Strategic Research Site

Saturday 17 morning

John ADAIR, The Social Psychology of Behavioural Sciences : Psychologists' Responses to a Methodological Paradigm Crisis

Specialty Studies (Chair : Nick Mullins)
(Friday 16 afternoon)

- G. BENGUIGUI, D. CHAVE, P. TRIPIER & P.F. RIVARD, Analysis of the Development of Two New Specialties
 J. CRAMER & R.P. HAGENDIJK, Disciplinary Background as a Cognitive Constraint
 Edward J. HACKETT, Bibliometric Indicators of Social and Intellectual Change in a Biomedical Research Area
 C.M. HEYES & H.C. PLOTKIN, Conspecific Learning : A Case Study of Changing Fashion in Science
 Gérard LEMAINE, Superior and Inferior People : Essay on the Nature-Nurture Debate in Differential Psychology
 Dirk STEMERDING, The Construction of Biology as a Modern Science in the 19th Century

Sciences in Context (Chair : John Law)
(Saturday 17 morning)

- Donald FISHER, The Scientific Appeal of Functionalism : Rockefeller Philanthropy and the Emergence of British Social Anthropology
 James FLECK, Epistemological and Ontological Commitments : Their Roots and their Influence on the Development of Scientific Knowledge, with Reference to the Case of Artificial Intelligence
 Paul HIOCH, Mikulas TEICH & Pnina ABIR-AM, Cultural, Scientific and Social Aspects of Refugee Biochemists from the 1930s
 Joop SCHIOPMAN, The Computational Paradigm, a Single One ?
 Frank STEENKAMP & Arie RIP, The Meadowbirds Organize a Symposium

Cross-Disciplinary Interactions
(Saturday 17 afternoon)

- Charles GALPERIN, Qu'est-ce que la synthèse des disciplines ?
 Jonathan HIRWOOD, Drawing Disciplinary Boundaries : Breadth versus Specialization in Inter-War Genetics
 David C. PURCHASE, The Interaction between Law and Science on Safety Issues : The Rise of a Metadiscipline or the Creation of a Subdiscipline ?
 Henk ZANDVOORT, The Two Aims of Science and the Cognitive Structure of Interdisciplinary Research

- Charles BAZERMAN, Codifying the Social Scientific Style : The APA Publication Manual as a Behaviorist Rhetoric
 Alain DROUARD, Labor Scientific Market and the Field of Social Sciences in France

- Barbara FRANKEL, The 'Rashomon Effect' and the Puzzled Ethnographer : On the Social Context of Anthropological Knowing
 Bernard-Pierre LECUYER, Ideological Constructs or Early Empirical Social Research ? A Conciliatory View on Socio-Medical Investigations on Occupational Diseases in France and Great Britain (1800-1850)
 Richard D. WHITLEY, The Bureaucratization of Investment Analysis and the Academic Establishment of Finance Theory

Social Sciences in Governance, in the Post-War Period
(Saturday 17 afternoon)

- Robert BALSTAD MILLER (on U.S.A.)
 L. RATIER-COUTROT (on France)
 B. WITTROCK (on Sweden)

SESSIONS ON TECHNOLOGY AND ON PUBLIC ISSUES OF SCIENCE AND TECHNOLOGY

Controversy Studies (Chair : Arie Rip)
(Thursday 15 afternoon)

- Gary L. DOWNEY, Ideological Identity Models and the Nuclear Power Controversy : An Anthropological Theory of Recruitment
 Frances B. McCREA, Knowledge and Interests : Intellectuals and the Anti-Nuclear Weapons Controversy
 Gerald E. MARKLE & Daryl E. CHUBIN, Consensus Development in Science : The Liver Transplant Controversy
 Alan MAZUR, When is Ideology Epiphenomenal ?
 James PETERSEN, Ideology and Resource Mobilization Theory

Sociology of Technological Developments
(Friday 16 morning)

- Wiebe BIJKER, Social Groups and Their Technological Styles : Towards an Explanation of the Development of the Technological Artefact 'Bakelite'
 Robert BUD, Why a History of Biotechnology ?
 Emmanuel CHADEAU, Technics and Technology Without Science : War

Supplies and French Aeronautics, a Model of No Interaction and its Effects from 1914 to the Years 1950

Boelie ELZEN, Determinative Factors in the Development of the Ultra-Centrifuge Technology

John LAW, The Development of Astronomical Navigation : A Note on Putting Vessels and Astronomical Objects in Their Proper Place

Jean MEYER, War and Science

Rein VOS & Henk BODEWITZ, The Dynamics of Clinical-Therapeutic Objectives and the Role of Medical Professional Groups in Drug Innovation

Science Education (Chair : Marc Spoelnders)
(Friday 16 morning)

Jean-François ROBERTS, The Scientific Imagination and the New Humanism : The Educational and Historical Contribution of Gerald Holton

Tove THAGAARD, Controversial Issues in Science Education : A Science-Based Training versus Interests in the Social Context of Science

Marleen THEUNIS, Dialogue : A Scientific Study of Its Verbal and Non-Verbal Aspects

Frank WINNUBST, Science Education and the Hidden Picture of Science : Scientific Versus Social Interests ?

Experts and Expertise in Public Arenas (Chair : José Van Eijndhoven)
(Friday 16 afternoon)

Henk BODEWITZ, Henk BUURMA & Gerard DE VRIES, Scientific and Social Construction of the Acceptability of New Drugs

Brian CAMPBELL, Accounting for Disagreements in Disputes Amongst Scientists as Experts

Frederick FRANKENA, The Emergent Social Role and Political Impact of the Voluntary Technical Expert : A Research Review and Example

Alan IRWIN, Risk and Public Policy : The Value of 'Technological Risk' for the Study of Science, Technology and Society

James E. KATZ, Scientific Information and Congressional Policymaking : The Clinch River Breeding Reactor as a Case of Big Science Meeting Big Politics

Michael POLLAK, 'Competence' and 'Credibility' in the Regulatory Game

Gender in Science and Engineering
(Saturday 17 morning)

Evelyn FOX GELLER, Gender, Science and Politics

Sally HACKER & Burton C. HACKER, Women and the History of Military

Technology

Laura NADER, Magic, Science, and Religion

David NOBLE, The History of Automation : Boys and Their Toys

Ellen VAN OOST & Saskia EVERTS, Women in Technological Science

Sharon TRAWEEK, Gender in the Laboratory : Men and Women in High Energy Physics

Science and Technology in Developing Countries
(Saturday 17 afternoon)

Benawar MEDIENE, Between Nationalism and Development : The Social Sciences in Algeria

Xavier POLANCO, Science in Developing Countries : An Epistemological Approach

DISCUSSION SESSIONS

Technology in Society (Chair : John Wilkes)
(Friday 16 afternoon)

D.J. BENNETT, P.E. GLASNER & G.D.L. TRAVIS, Policy Development in Genetic Manipulation Research in Britain

Frederick BETZ, Interface Between Science and Technology

Gary BOWDEN, Political Jurisdiction and the Adoption of Coal Mining Technology in Western Canada

Roger DITTMAN, Theories of the Phenomena of Nuclear Escalation : Critical Comparative Analysis

Kenneth GREEN, Innovation in Health Care Information Technologies

Jaap JELSMMA, Changing Risks of Recombinant DNA : New Facts or a Changing Problem ?

Donald LEACIE, Long Waves, Logistic Curves and Technology Clusters

Loet LEYDESDORFF, Trade Unions and Science & Technology Policy

Simone B. NOVAKS, Sperm Banking and the Practice of Artificial Insemination : The French CECOS Banks

G.D.L. TRAVIS & P.E. GLASNER, The Social Construction of a Health Hazard : Trade Unions and the Use of Visual Display Units

John M. WILKES, Searching for the Source of Technology's Force

Richard WORTHINGTON, Is There Any Such Thing As High Tech ?

Scientometrics and Quantitative Studies of Science (Chair: Belver Griffith)
(Saturday 17 morning)

- Alan E. BAYER, John C. SMART & Gerald W. McLAUGHLIN, Mapping Intellectual Structures of a Scientific Subfield through Author Co-citations
Donald de B. BEAVER, Teamwork : A Step Beyond Collaboration ?
Virginia CANO SLIS, Citation Behaviour of the Members of a Research Front: The Case of the Field of Structural Reliability
J.-P. COURTIAL & S. BAUIN, Topology of Socio-cognitive Networks
R.P. HAGENDIJK & A.A.M. PRINS, Dependence and Task Uncertainty in a Local Community of Sociologists
Lowell L. HARGENS & Barbara F. RESKIN, Ph.D. Migration Patterns and the Hierarchy of Scientific Fields
S.G. LEVIN & Paula E. STEPHAN, Methodological Issues Raised in Estimating the Relationship Between Publishing and Age
H.F. MOED, W.J.M. BURGER, J.G. FRANKFORT & A.F.J. VAN RAAN, Characteristics of Self-Citation Behavior
H.F. MOED, W.J.M. BURGER, J.G. FRANKFORT & A.F.J. VAN RAAN, The Use of Quantitative Data for the Measurement of University Research Performance
Birte NEUBERT, H.-D. DANIEL & R. FISCH, Women in Science -- Social Background and Productivity of Male and Female Professors in West-Germany
John C. SMART, Alan E. BAYER & Gerald W. McLAUGHLIN, Collaborative Style in Academic Science : A Longitudinal Study of Chemists
William E. SNIZEK, A Re-examination of the Ortega Hypothesis : The Dutch Case
Geert DE SOETE, Hierarchical Analysis of Scientometric Transaction Data

Reassessing the Impact of Science Policy on New Disciplines
(Saturday 17 afternoon)

- Pnina ABIR-AM, Beyond Deterministic Sociology and Apologetic History : Reassessing the Impact of Research Policy upon New Scientific Disciplines
(+ discussants).

Wednesday 14 afternoon (15.00 – 17.45)	Registration (at the Faculty of Letters and Philosophy, Blandijnberg 2, 9000 Gent)				
Wednesday 14 evening (20.00)	Opening of the George Sarton Centennial and of the Sarton Exhibition, with Reception at the Generale Bankmaatschappij (Kouter 8, 9000 Gent) Chair : Marc De Mey Formal Opening by the Rector, André Cotténie; by the Dean of the Faculty of Letters and Philosophy, Walter Prevenier; and by Fernand Vandamme for the Conference Chairmen. Opening Lecture by Arnold Thackray (editor of Isis).				
Thursday 15 morning (9.30 – 12.30)	Plenary Session on George Sarton Chair : Fernand Vandamme Contributors : Robert K. Merton, Marc De Mey a.o.				
	sessions on Cognitive Studies and Scientific Practices	sessions on Structures and Development of Sciences	sessions on Sciences, Policies and Practicalities	sessions on Technology and on Public Issues of Science and Technology	
Thursday 15 afternoon (14.30 – 17.45) *	Is Science Constructed ? Chair : Steve Woolgar	Birth of Modern Science A. Muslim Medieval Science, Averroism, and the Birth of Modern Science Chair : Hosam Elkhadem B. Alchemy, Astrology and Modern Science Chair : Gérard Simon	Evaluating Priorities in Science Chair : Otto Larsen	Controversy Studies Chair : Arie Rip	Cognitive Studies - Opening Session Chair : Henry Small
Friday 16 morning (9 – 12.15) *	Scientific Practices Chair : Harry Collins	Sociology of Mathematics Chair : Sal Restivo Social System of Engineering Chair : Michel Callon	Perspectives on Cognitive Authority in the Sciences Chair : Richard Whitley	Sociology of Technological Developments Chair	Science Education Chair : Marc Spoelders
Friday 16 afternoon (14.30 – 17.45) *	Cognitive Studies I Chair : Dirk Vervenne	Specialty Studies Chair : Nick Mullins	Sociology of Medical science and Medical Practice Chair :	Experts and Expertise in Public Arenas Chair : José van Eijndhoven	Technology in Society Chair : John Wilkes (discussion session)
Saturday 17 morning (9 – 12.15) *	Cognitive Studies II Chair : Marc De Mey	Sciences in Context Chair : John Law	Social Sciences as a Strategic Research Site Chair	Gender in Science and Engineering Chair	Scientometrics and Quantitative Studies of Science Chair : Belver Griffith (discussion session)
Saturday 17 afternoon (14.30 – 16.00)	Cognitive Studies III Chair : Arthur Miller	Cross-Disciplinary Interactions Chair	Social Sciences in Governance, in the Post-War Period Chair	Science and Technology in Developing Countries Chair :	Reassessing the Impact of Science Policy on New Disciplines Chair : (discussion session)
(16.00 – 17.00)	Concluding Plenary Session				*Breaks : 10.30 – 10.45 and 16.00 – 16.15.

The George Sarton Centennial joint conference will be preceded by:

INTERNATIONAL CONFERENCE ON EVOLUTIONARY EPISTEMOLOGY (ERISS – II)

University of Ghent, Belgium

Hoger Instituut voor Kunstgeschiedenis en Oudheidkunde
Sint-Hubertusstraat 2, 9000 Gent

November 12 – 14, 1984

Organized by ICIWO (Interuniversitair Centrum voor Interdisciplinair Wetenschappelijk Onderzoek). Program chair: Werner Callebaut & Rik Pinxten.

As a philosophical and metascientific research program, evolutionary epistemology (EE) describes and explains man's common-sensical cognitive abilities and the emergence of science – a most sophisticated cognitive device which is in part exosomatic – in terms of man's biological adaptation to his natural and self-created environment. The more ambitious varieties of EE also aim to explain the construction, validation and justification of actual scientific knowledge claims, methods etc., in terms of the operation of a tandem mechanism of ultimately blind, i.e. unjustified variation and subsequent selection (Campbell). EE is also being defined as a particular way of looking at the phenomenon of life in general, viz. as a biological research program based on the idea that all living systems are knowledge systems, and that all forms of biological cognition share some essential features (Morin, Plotkin...).

The aim of this conference is to follow up the endeavor originated at the ERISS (Epistemologically Relevant Internalist Sociology of Science) Conference organized by Donald T. Campbell at Cazenovia Lake, New York, June 20–27, 1981: To extend the 'philosophy' of EE into an empirically valid and dynamic naturalistic theory of knowledge.

The main topics that will be discussed are:

- the potentialities and limitations of current biological models of evolution – neo-Darwinian models and models critical of the 'new synthesis' – as models for a scientific theory of knowledge and cognition;

- the mutual relationship between biological and epistemological models of evolution (phylogenesis) and development (ontogenesis) (cf. Piaget's genetic epistemology);
- the emergence of the evolutionary paradigm in physics (Prigogine's far-from-equilibrium dynamics etc.) and its implications for natural philosophy, the life sciences, and dynamic theory of knowledge;
- the problem of evolution and dynamism in and via language and formalization.

We are seeking out distinguished publishers for the eventual publication of a volume which would emerge from the conference.

PROVISIONAL PROGRAM

Monday 12 November

9 a.m. Registration

10 a.m. Opening of the Conference by the Academic Authorities

10.30 a.m. Position Paper

Werner Callebaut (Administratieve en Economische Hogeschool
& Limburgs Universitair Centrum) & Rik Pinxten (Rijksuniversiteit Gent)

2 p.m. Session 1: Emergence of the Evolutionary Paradigm

Henry C. Plotkin (University College London); Ilya Prigogine
(Université Libre de Bruxelles & University of Texas at Austin),
Jef Schell (Rijksuniversiteit Gent & Max-Planck-Institut Köln)

CULTURAL EVENTS

Exhibition

The opening reception for the joint conferences will also constitute the opening ceremony of a George Sarton Centennial Exhibition at the Generale Bankmaatschappij, Kouter 8, Gent. This exhibition will be open from November 14 until December 2. A selection will also be displayed at the "Pand".

Theatre : "Na '84" ("After '84")

Thursday 20th, Arca Schouwburg, Sint-Widostraat 4, 9000-Gent.

At the end of 1982, Communication & Cognition intended to devote a stage-play, in the margin of the Sarton Centennial, to Orwell's novel "1984". They had several reasons for this : 1984 is "Orwell's year"; Sarton considered theatre as instrumental to social enhancement; and the relationship between language, thinking, the individual, knowledge and society takes a central place in the novel. The novel in fact describes how a special Party team constructs a new language, Newspeak, to eliminate "wrong" thoughts, by which the speakers are conditioned to surrender and obey completely Big Brother – a nearly almighty yet invisible dictator.

Orwell here joins the centuries-old dispute between sophists or strict nominalists and idealists or realists in Western history. The former consider language as a tool developed by man and capable of adaption when his insights change. Thus a firm relationship between word and phenomenon does not exist, which, in contrast, the latter – who probably need absolute certainties and are afraid of arbitrariness – defend.

Starting from these basic thoughts, the sponsors, stage-manager Roger Vandenbrande and author Achilles Gauthier set out to create a sequel to "1984" in which the dictatorship of Big Brother would be abolished and manipulation through language ruled out. It soon appeared to them that Orwell presents an incomplete picture of the ways of total dictatorship, which allows him to present it as insuperable.

Orwell originally intended to call his novel "The Last Man". Yet the authors of the stage-play did not want a play that subscribes to the book's fundamental pessimism – which can be easily misunderstood as resignation if it is forgotten that "1984" is a fiction showing an exaggerated, misrepresented,

Tuesday 13 November

9 a.m. Session 2 : Evolution and Development

Peter Allen (Université Libre de Bruxelles); Christiane Gilliéron (Université de Genève); Gerhard Vollmer (Justus-Liebig-Universität Giessen)

2 p.m. Session 3 : Evolutionary Epistemology and the Social Sciences

Claude Lamontagne & Jean Bernabé (University of Ottawa); Jean Paul Van Bendegem (Rijksuniversiteit Gent); Philippe Van Parijs (Université Catholique de Louvain); Dirk Vervenne & Dani De Waele (Rijksuniversiteit Gent).

Wednesday 14 November

9 a.m. Session 4 : Formal and Linguistic Sciences and Evolutionary Epistemology

André Martinet (Scéaux); René Thom (Institut des Hautes Etudes Scientifiques, Bures-sur-Yvette); Fernand Vandamme (Rijksuniversiteit Gent)

2 p.m. Session 5 : Evolutionary Epistemology : State of the Art in Philosophy of Science and Science of Science

Louis Boon (Rijksuniversiteit Utrecht); Donald T. Campbell (Lehigh University); Karin D. Knorr-Cetina (Universität Bielefeld).

5 p.m. General Conclusions

Banquet

A 4S Awards Banquet will be held at the "Pand" on Friday night, November 16. It will be accessible to all participants, at the price of \$ 25,- (1300,- Bfr). Tickets can be ordered on the registration form.

Guided Tour

On Sunday, November 18, we will organize a guided bus tour to Bruges. Participants interested to join on this tour should indicate their interest on the registration form (Approximate costs, including lunch at a special restaurant 1300,- Bfrs (\$ 25,-)).

Travel

Though many participants have indicated their interest in special flight arrangements, the potential number of users of special flights is too low for the Belgian airline SABENA to offer special rates in extra to its competitive APFEX and its SUPER BARGAIN fares (the latter for travel between the US and Europe). The November 1984 rates for a New York - Brussels roundtrip will be known by the end of June. Sabena will be the official carrier of the conference and a Sabena representative will be available for handling flight arrangements (re-confirmation, reservation, changes, etc.). Participants interested in flying Sabena should inquire at their nearest Sabena-information office or write to Sabena mentioning the conference :

Sabena Ghent
Kouter 151
9000 Gent, Belgium
Tel. 32 (0)91 236945
Telex Gent 11.709.

Ghent is about 55 kilometers from Brussels airport. There exist two convenient options for local transport :

1. A Sabena coach leaving from the airport to Gent Kouter, center of the city, and St-Pieters, central railway station : only five coaches a day (8.10, 11.10, 15.10, 18.10, 21.30) at 200,- Bfr. one way (take ticket on the bus).
2. A train connection from the airport to Brussels Central railway station connecting with trains to Ghent (change trains at Brussels North or Central). This train connection is very convenient with frequent trains all day long. Tickets must be taken at the train counter downstairs in the airport.

incomplete and inaccurate picture of a dictatorial utopia.

Orwell is basically pessimistic because he presents the strict nominalist, sophisticated point of view as inevitable as well as degrading. He follows the footsteps of other thinkers here, and not the least ones. The awareness of the centrality of language and symbolization in the formation of knowledge and of the world-view of every individual, group and society would lead inevitably – in Orwell's view – to the manipulation of individuals and groups and thus to their de-humanization (by means of formalization and normalization of language and symbolization).

An anti-Orwellian, pro-sophist will claim, on the contrary, that taking language and symbolization seriously will lead to more humanism. For knowledge and world-views are the result of a common construction by all, under the responsibility of everyone, through their interactions. Saying that every human observation and interaction is built on symbolization and language does not mean that everything is arbitrary. On the contrary, the relevance of a symbolization will depend upon its efficiency for realizations in co-operation. The sophisticated point of view thus implies a maximal relativity of theories (etc.), without sinking into an arbitrary subjectivity. Theories (etc.) are means for groups and individuals, but no more than that. They are thus subjected to the group and the individual, which opens a way to a genuine humanism.

Starting from such an anti-Orwellian perspective, a stage-play has been designed which is a continuation of the novel. Winston Smith is kept as a leading figure. He waits, after his brain-washing, in peaceful adoration of Big Brother, for his execution. In a flash-back we experience his past, which allows the spectators who have not read Orwell's novel to track the story. Later on, Winston is adopted in a new revolutionary movement : a Second Brotherhood. Big Brother uses all means to persuade the rebels of the senselessness of their revolt ...

The play also refers to a meta-level on which various questions are asked about the meaning of "1984" and its possible continuation. Finally, four possible conclusions are presented.

"Na '84" treats Orwell's "1984" in an unusual way and tries to escape from the cheap, exaggerated stereotypes it has given rise to on the Left as well as on the Right. It tries to keep an openness until the end and invites further discussion.

The scenery has been designed by sculptor Jan Verleeye and Luc Verbiest.

Registration

Participants and attendees are urged to register in advance. Please complete and return the enclosed form to :

Communication and Cognition

George Sarton Centennial

Blandijnberg 2

B-9000 Gent

Belgium

Conference Committee

Chair : F. Vandamme, N. Mullins, J.H. Ziman

Members : W. Callebaut, S. Cozzens, M. De Mey, A. Rip.

Program Committee

Chair : W. Callebaut, S. Cozzens, A. Rip

Members : R. Burian, C. Caswell, B. Griffith, K. Knorr-Cetina, B.-P. Lécuyer, Sal Restivo, J.P. Van Bendegem, John Wilkes.

Lokal Arrangements Committee

Chair : M. De Mey

Members : W. Callebaut, R. Pinxten, J.P. Van Bendegem, F. Vandamme.

Exhibition Committee

K. De Clercq, M. De Mey, A. Derolez, R. Mertens, J. B. Quintijn, A. M. Simon, M. Thiery, F. Vandamme

Advisory Committee

L. Apostel, H. Baithazar, G. Canguilhem, I.B. Cohen, A. Cottenie, K. De Clerck, H. Deelstra, M. Gosselin, A.R. Hall, G. Holton, J. Hoste, F. Lowenthal, R. K. Merton, J. Needham, Sir K.R. Popper, J.B. Quintyn, H. Roelants, A. Thackray, M. Thiery, R. Van Caeneghem, A. Verhulst.

Unless sightseeing is the purpose, neither taxi nor car rental are advisable for local transportation from Brussels to Ghent since they will be substantially more expensive than either coach or train.

Accommodation

Accommodation is available in local hotels. Arrangements should be made through the Tourist office of the city of Ghent by means of the enclosed form. While Ghent has a sufficient number of hotels to accommodate participants, they are at various distances of the meeting place. Most of them are within walking distance (from five to twenty minutes easy walk through the center of the city). Indicated below, some examples to indicate prices and walking distances :

Benelux Recolletenlei 1	5'	single 1400,- Bfr (28,- \$)	double 1500,- Bfr (30,- \$)
St.-Jorishof Botermarkt 2	10'	single 1450,- Bfr (29,- \$)	double 1765,- Bfr (35,- \$)
Eden Zuidstationstraat 24	20'	single 1300,- Bfr (26,- \$)	double 1600,- Bfr (32,- \$)
Europahotel Gordunakaai 59	30'	single 1300,- Bfr (26,- \$)	double 1750,- Bfr (35,- \$)
Holiday Inn Ottergemsesteenweg 600	60'	single 2185,- Bfr (44,- \$)	double 2995,- Bfr (60,- \$)
		corporate rate	

(In general, breakfast is included; exact prices depending upon the rate of exchange; above estimations: one US dollar = fifty (50 Bfrs.; current rate (March '84): 1 \$ = 55 Bfrs.

The hotel reservation form should be sent directly to :

City of Ghent

Tourist Office

Belfortstraat 9B

9000 Gent, Belgium

telex 12712 dt gent b

teleph. 32 (0)91 253641 or 241555

[SEE NEXT PAGE FOR FORMS]

**4S Annual Meeting, Ghent, Belgium
14-17 November 1984**

George Sarton Centennial
Conference on Evolutionary Epistemology

NAME :
ADDRESS :
CITY : STATE/PROVINCE COUNTRY :
would like to reserve in hotel/pension/boarding-house :
preference : 1.
Type of room - single
..... bedded rooms
3. with/without bath
to (date of arrival)
to (date of departure)
indicate whether you travel by plane/train or by car
The mediation is done by the Tourist office to the best of its ability without
assuming any responsibility

NAME :	FIRST NAME :		
AFFILIATION :	STATE/PROVINCE :		
ADDRESS :	COUNTRY :		
CITY :			
COUNTRY :			
Enter cost for all events that you wish to attend :			
- Conference on Evolutionary Epistemology (ERISS-2);			
Nov. 12-14; conference fee, before October 12		1.700 Bfr.	(\$ 30,-)
after October 12		2.000 Bfr.	(\$ 35,-)
student conference fee		850 Bfr	(\$ 15,-)
4S, EASST, C&C joint meeting: Nov. 14-17;			
conference fee, before October 12		1.700 Bfr	(\$ 30,-)
after October 12		2.000 Bfr	(\$ 35,-)
student conference fee		850 Bfr	(\$ 15,-)
- free tickets theatre 'Na '84'			
- 4S Awards Banquet, November 16 ... x 1300,- Bfr (\$ 25,-)			
- Bus tour Bruges, November 18 : ... x 1300,- Bfr (\$ 25,-)			
- Lunch tickets (available Mon Nov 12 to Sat. Nov. 17 incl.)			
(nov 12 - Nov 14 : University restaurant "De Brug"			
St.Pietersnieuwstraat, Gent)			
(Nov 15 - Nov 17 : "Pand" Onderbergen 1, Gent)			
..... lunch tickets at 300,- Bfr (\$ 6,-)			
- Bank costs (not due, if payment in Belgian francs by Euro- cheque, International money order, or a cheque drawn on a Belgian Bank, Bank Account C&C ASLK 001-0454888-34)			(\$ 4,-) *
TOTAL AMOUNT ENCLOSED			

TOTAL AMOUNT ENCLOSED

COMPLETE FORM ABOVE, AND SEND TO:

CITY OF GHENT
Tourist Office

belfortstraat 9 B

**9000 GENT
BELGIUM**

***4S Members:** Bank Charges can be avoided by registering through 4S before October 1. Send this registration form and full fees to:

4S Treasurer
Department of Sociology
Indiana University
Bloomington, Indiana 47405

AFTER OCTOBER 1, send registration materials to:

**Communication and Cognition
George Sarton Centennial
Blandijnberg 2
9000 Gent
Belgium**

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Department of Sociology

Indiana University

Bloomington, Indiana 47405

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Note: Subscription will begin with Volume 2, Number 1, 1984.

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Minutes of the 4S Council Meeting

Blacksburg, VA, Nov. 3, 1983

Present: Council Members - B. Barber, D. Edge, R. Goodell, L. Hargens,
J. Holmfeld, K. Knorr-Cetina, L. Lubrano, A. Thackray, J. Ziman

Candidates for 4S Offices - H. Bauer, R. Burian, D. Chubin,
H. Collins, J. Gaston, S. Long, N. Mullins, S. Restivo, A. Teich,
R. Westrum

Members of 4S Committees - A. Bayer, J. Smart

- I. President Thackray called the meeting to order at 8:50 p.m.
- II. Bernard Barber presented the report of the Nominations Committee.
- III. The Secretary-Treasurer reported results of various 4S activities during 1983.
 - A. The 1983 4S balloting resulted in the election of Nicholas C. Mullins as President, J. Scott Long as Secretary, and new Council members Daryl Chubin, Harry Collins, Sal Restivo and Ron Westrum.
 - B. The Council discussed the current status of 4S membership and finances. John Ziman reported on the possibility of collecting dues payments from European members so that their currency exchange charges can be reduced.
 - C. The Secretary-Treasurer reported on plans to increase institutional subscriptions to the 4S Review. After discussion by the Council, it was concluded that increasing our institutional subscription list will largely depend on the efforts of individual 4S members to encourage their local libraries to subscribe. All members are urged to use the form printed in the 4S Review for this purpose.
- IV. Alan Bayer and John Smart gave the report of the Local Arrangements Committee. The Council discussed a number of issues about general policies regarding finances, book displays, and other aspects of the annual meeting. The Council expressed its thanks for the Local Arrangements Committee's excellent job in arranging the convention.
- V. Nicholas Mullins reported on the activities of the Committee on Future Meetings (see p. 41 of Vol 1 # 2 of 4S Review). It was moved and seconded that 4S hold its 1984 annual meeting in Ghent, Belgium. The meeting will be held jointly with the European Association for the Study of Science and Technology (EASST) and Communication and Cognition, a Belgian group for interdisciplinary studies of cognition and science. The motion was passed. Mullins reported on the state of arrangements for the 1985 and 86 4S meetings. The Council thanked the Committee for its work.

- VI. Ron Westrum presented the report of the Program Committee for this year's meeting. The Council thanked the committee for its efforts in putting together an excellent program.
- VII. Jerry Gaston reported on the publication of the first three issues of the 4S Review. A breakfast meeting of the Publications Committee and other interested members was announced for the purpose of determining future directions for the Review. The Council thanked Gaston for his work as editor of the Review.
- VIII. Arnold Thackray reported on the work of the Charter Review Committee. The Council discussed the proposed revisions of the 4S Charter, which modify the existing Charter in four respects:
 - 1) The number of Council members (not including the President, Secretary, and the Treasurer) will increase from seven to nine.
 - 2) The term of office of Council members will increase from two to three years.
 - 3) The office of Secretary-Treasurer will be split into the separate offices of Secretary and Treasurer.
 - 4) Council membership will be more closely linked to participation on standing committees.

The Council discussed various aspects of the proposed charter revision, and devoted considerable attention to means by which a diverse Council membership (in terms of disciplinary orientation, nationality, etc.) can be insured. The discussions resulted in two changes in the proposed revision.

- 1) It was moved and seconded that the word "him" in paragraph A, Section III be changed to "the president." The motion passed.
- 2) It was moved and seconded that the following sentence be added to paragraph A of Section II: "Every effort will be made to have as broad a disciplinary representation as possible in the membership."

The motion passed.

It was moved and seconded that the proposed Charter revisions, as amended by the Council, be submitted to the consideration of the members at the general business meeting.

- IX. Daryl Chubin and Rae Goodell, 4S representatives to AAAS, discussed current 4S participation in AAAS activities. It was moved and seconded that 4S should petition AAAS for membership in section K (Social and economic sciences). The motion passed.

It was moved and seconded that Chubin and Goodell proceed with arrangements for 4S participation in the AAAS meetings in New York during May, 1984. The motion passed. It was agreed that a dinner meeting or social function be arranged for 4S participants at the New York AAAS meeting. The problem

of scheduling 4S sponsored sessions at AAAS meetings was discussed. Chubin and Goodell expressed the belief that the Council and President should take steps to formalize mechanisms for 4S participation in AAAS activities.

Finally, it was announced that AAAS is considering the establishment of a new section on science, technology and society.

The Council expressed its thanks to Chubin and Goodell for their work as representatives to AAAS.

- X. John Ziman reported that the Bernal Prize Committee had selected Thomas S. Kuhn for the 1983 Bernal Prize. The Council thanked the Committee for its work, and the Institute for Scientific Information for its generosity in supporting the Prize.
- XI. President Thackray presented a request from the Consortium of Social Science Associations (COSSA) for continued support of its activities. It was moved and seconded that 4S give \$500 to COSSA. The motion passed.
- XII. The Council discussed means of commemorating the contributions of Derek J. deSolla Prize to social studies of science. After several ideas were suggested, it was decided to appoint a committee to look into ways that the Society can establish an appropriate memorial to Price and his work.

The Council meeting was adjourned at 10:45 p.m.

ANNOUNCEMENTS: FEDERAL AGENCIES

Scholars Awards in History and Philosophy of Science

In order to make the most effective use of limited funds for research in the History and Philosophy of Science Program, the National Science Foundation announces revisions in the special classes of awards established in 1981.

1. A *Summer Scholars Award* consisting of awards up to \$9,000 for partial support of full time summer research and/or related costs;
2. A *NSF Scholars Award* consisting of awards up to \$30,000 for partial support of one or more semesters of full time academic year release time and related expenses. These grants are intended to support the needs of historians and philosophers of science for more sustained periods of research.

We expect to reserve at least 60% of available program funds for these classes of awards.

Who May Submit:

Proposals may be submitted through normal institutional channels by any qualified faculty member in accordance with the instructions contained in the brochure *Grants for Scientific and Engineering Research* (NSF 83-57). In cases where a researcher has no institutional affiliation, the proposal may be submitted by the individual. The program welcomes proposals on behalf of qualified researchers and strongly encourages women, minorities, and the handicapped to compete fully in this program.

Contents of the Proposal:

The proposal should have the same format and content as normal research proposals (see *Grants for Scientific and Engineering Research* NSF 83-57). A 200-word project sum-

mary suitable for publication is required. The project description should not exceed ten single-spaced, typewritten pages and should include: (a) a description of the scientific significance of the work and the design of the project in sufficient detail to permit evaluation; (b) presentation and interpretation of progress to date if the research is already underway; and (c) accomplishment anticipated at the conclusion of the period for which support is requested.

Costs of Research:

Grants will be awarded in amounts of up to \$9,000 (Summer Scholars Program) and \$30,000 (NSF Scholars Award). Budgets for less than these amounts may be submitted and the NSF may also negotiate changes in amounts. An applicant may apply in one proposal, where appropriate, for two summers (up to \$18,000) or a Scholars award and one Summer award over two years (up to \$39,000). Funds may be requested to defray any normally allowable costs of the research, including indirect costs (in full or in part) if the grantee chooses to recover them. It is expected that the principal investigator will devote a minimum of one semester full time to the research under the NSF Scholars Award. If grant funds are to be requested for items normally requiring prior NSF approval, these should be justified in the proposal (i.e., foreign travel, permanent or general purpose equipment, etc.). NSF Form 1030 (Summary Budget) must be submitted with appropriate justification and basis for estimating the requested amount.

Evaluation of Proposals:

Proposals will be evaluated in accordance with normal Foundation procedures and criteria (See NSF 83-57 for discussion).

Submission Procedures and Award:

Proposals should be submitted to the Data Support Services Branch, National Science Foundation, Washington, D.C. 20550. Twenty copies of the proposals are necessary, one of which should be signed by the principal investigator and an official authorized to sign for the institution.

Forms for the cover page and project summary are contained in the appendices of *Grants for Scientific and Engineering Research*. Proposals may be submitted at any time. However, awards will normally be announced within six months after the target date. There are two target dates: September 1 and February 1. Grants from other sources may be held to cover additional costs of the research.

Grant Administration:

Awards will be made on a fixed amount basis subject to the conditions of the grant instrument and this Announcement. A fixed amount award represents a predetermined amount for NSF support of the proposed research without regard to the subsequent costs of the project. Note to Institutional Research Administrators: grants awarded on a fixed amount basis are not subject to Federal cost principles, e.g., OMB Circular A-21. As part of the final report required by the grant general conditions, the grantee will be requested to certify that the level of effort funded was actually expended.

Other Types of Awards Available:

Projects involving the preparation of significant reference works, research tools, scholarly editions of scientists' papers, archives, etc., or which require more funding from NSF than provided by the Scholars Award will be considered. The History and Philosophy of Science Program is limited in its ability to support such projects. It is strongly recommended that projects of this nature be discussed in advance with Foundation staff. However, up to 40% of available funds may be used to support projects in this category.

If there are any questions about these awards or about the History and Philosophy of Science Program, contact:

Program Director or Associate
History and Philosophy of Science
National Science Foundation
1800 G Street, N.W.
Washington, D.C. 20550

National Science Foundation

EVIST

November 1, 1984 is the next closing date for submitting preliminary proposals to the EVIST program.

EVIST supports research and related activities to help to answer the question: How can the ethical problems and value conflicts associated with current scientific, engineering, and technical activities be better understood and more effectively resolved, by scientists and engineers, scholars in the humanities, persons making science policy, and members of affected groups?

Projects focus on the activities of scientists (including social scientists) and engineers in areas of social or professional concern. They are intended to clarify the ethical implications or value assumptions of those activities and to contribute to improved policies and practices affecting and affected by them.

EVIST makes awards for research, individual professional development, and dissertation support. For further information, contact:

Rachelle Hollander
EVIST, NSF
Washington, D.C. 20550
202/357-7552

ANNOUNCEMENTS: FUTURE CONFERENCES/MEETINGS

Speech Communication Association: Seminar on Disciplinary Boundaries

The Speech Communication Association is sponsoring a seminar at its 1984 convention entitled "Disciplinary Boundaries and the Rhetoric of Rationality." The convention itself is scheduled for the Palmer House in Chicago, November 1-4, but the seminar is slated for just the first day. The seminar organizers, Steve Fuller (History and Philosophy of Science, Pittsburgh) and Charles Willard (Communication, Louisville), invite papers on the role that academic and professional boundaries play in claims made about the nature of rational inquiry. Issues to be addressed include these: Do a discipline's method of falsification refute claims once they reach a disciplinary forum or, rather, do they prevent claims from ever reaching that forum? (The suggested contrast is between Popper and Foucault.) Do disciplinary boundaries really exist? How are they drawn? How are they crossed?

Potential participants are first advised to prepare a two-page abstract as soon as possible, in order to get an early go ahead (or rejection, as the case may be) from the organizers. Actual participants are then required to have a 15-20 page text ready to circulate to the other participants by early September at the latest. In Chicago, the papers will not be read aloud, but discussed in roundtable fashion. If the quality of the papers is high enough, publication will be sought. Interdisciplinary approaches are encouraged. Abstracts and queries should be sent to: Steve Fuller, Department of History and Philosophy of Science, University of Pittsburgh, Pittsburgh, PA 15260.

Society for the History of Technology

The 1984 annual meeting of the Society for the History of Technology will be held in Cambridge, Massachusetts, November 1-4, 1984. The meeting will be hosted by M.I.T.'s Program in Science, Technology and Society. Persons desiring registration materials or other information should contact: Gayle Fitzgerald, Campus Information Services, Room 7-111 MIT, Cambridge, MA 02139. Registration materials will be available September 1st.

Midwest Junto Meeting

The annual Midwest Junto meeting will be held April 18-20, 1985, on the University of Minnesota campus in Minneapolis. For further information, contact:

William Aspray
Charles Babbage Institute
104 Walter Library
University of Minnesota
Minneapolis, MN 55455
(612) 376-9336

Center for the Study of Ethics in the Professions

Illinois Institute of Technology

Research Conference on Property Controls for Science and Technology

Under a grant from the National Science Foundation (EVIST program), Vivian Weil, CSEP Senior Research Associate, and John Snapper, Assistant Professor of Philosophy and CSEP Faculty Associate, are Principal Investigators for a 1985 Conference on "Ethical Implications of Trade Secrecy, Patents, and Related Property Controls for Science and Technology." The project will bring together scientists, engineers, research managers, and specialists from a diversity of academic disciplines including law, philosophy, history, and social science.

Through review essays, case studies, and essays of ethical analysis, invited participants will assess alternative forms of intellectual property protection. Discussion will focus on the ways in which these protections influence the practice of science and the structure of our private research institutions while promoting or threatening certain values or interests of individual researchers, their institutions, and the wider society. Publication of conference papers, comments, and discussion notes is anticipated.

Scholars, research managers, scientists, engineers, and others interested in the project should contact Dr. Weil (312) 567-3472 or Dr. Snapper (312) 567-3479.

Society for Philosophy and Technology

The Third Biennial Meeting of the Society will be at the Technical University of Twente, The Netherlands, from August 12-16, 1985, with a general theme of technology and responsibility. Symposia are being planned on the integration of technology and society, philosophical anthropology and technology, methodological issues, technology and work, autonomy of technology, engineering ethics, and religion and technology. Papers on other subjects and suggestions for additional symposia are welcome. The official language of the conference is English, but papers written in German will be accepted with English summaries. The deadline for receiving papers for consideration is November 30, 1984. All participants who are reading papers and were members of SPT in 1983 will have their lodging and meals paid for by our Dutch hosts. Travel costs must be borne by participants themselves. Address all correspondence to the President, Alex C. Michalos, Philosophy Department, University of Guelph, Guelph, Ontario, Canada, N1F 2W1.

Conference on Experimentation in the Natural Sciences Newton Park, Bath, England 30 August - 2 September 1985

A conference on historical, sociological and philosophical perspectives on experimentation in the sciences will be held at Newton Park, near Bath, from 30 August to 2 September 1985. Sessions will address specific topics and problems, including: observation; the construction of experience; crucial experiments; what makes a good experiment?; the changing character and function of experiment from the scientific revolution; the new historiography of experiment; the interaction of experimental techniques with ideas; experiment and argument; pedagogical uses of experiment, and the implications for science education and science studies. Sponsors include the British Society for the History of Science and the BSA Science Studies Group. The conference is being organized by H. M. Collins, D. C. Gooding (both Science Studies, Bath), T. J. Pinch (Sociology, York) and S. Shapin (Science Studies, Edinburgh). For information about the programme please contact Dr. D. C. Gooding, School of Humanities and Social Sciences, University of Bath, Bath BA2 7AY, England. Those wishing to receive the first circular should send an SAE or address label to "Experimentation Conference Circular," c/o Mrs. Nicola King, School of Humanities and Social Sciences, University of Bath, Bath BA2 7AY, by 1 November 1984.

ANNOUNCEMENTS: NEW PROJECT: SCIENCE/STS

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Rustum Roy
Director, S-STs Project
The Pennsylvania State University
202 Materials Research Laboratory
University Park, PA 16802
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☐ I have created S-STs teaching materials and would be willing to share them.
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☐ I would be interested in leading teacher training workshops in the S-STs area.

Send to: Rustum Roy, Director, S-STs Project, The Pennsylvania State University
202 Materials Research Laboratory, University Park, PA 16802

ANNOUNCEMENTS: STUDENTSHIPS, FELLOWSHIPS, INTERNSHIPS, GRANTS

**ESRC Linked Studentship
History of Science-based Industries
London School of Economics
Business History Unit**

Applications are invited for a studentship to be based with a group working on historical aspects of science-based industry, industrial research and development, and innovation. The student will identify a suitable industry and will research historical trends for firms over the past century. The concentration might be in chemicals, electronics, scientific instruments, pharmaceuticals, or similar technically orientated industries. Cross national comparisons or technology transfer studies are encouraged.

The successful candidate might come from a background in economic history or history of science and technology, or from a technical or economics training with some historical study. The work is to be supervised by Professor L. Hannah and Dr. J. Liebenau. For further information contact: Dr. J. Liebenau, Business History Unit, Lionel Robbins Building, 10 Portugal Street, London EC2A 2HD, 01-242-3388 ext. 208.

AAAS Science, Engineering, and Diplomacy Fellowship

The American Association for the Advancement of Science (AAAS) invites members to apply for a Science, Engineering, and Diplomacy Fellowship. The program selects scientists, engineers, and other science-related professionals to work for one year with either the Bureau of Oceans and International Environmental and Scientific Affairs of the Department of State (STATE), or a scientific/technical office of the Agency for International Development, or other appropriate locations within these two agencies. The purpose of the program is to make more effective use of scientific knowledge in government, to educate the scientific and engineering community about public policy process, and to broaden the perspectives of both communities regarding such interactions.

The AAAS will select two 1984-1985 Fellows in cooperation with the State Department and the Agency for International Development. These Fellows will serve a one-year appointment at a salary consistent with education level and experience, and, with the case of STATE, if possible, but not exceeding, the GS-12 level (beginning at \$30,000). Fellows serving in AID will receive a stipend from AAAS. A secret level clearance must be obtained before a selectee can begin working at either position. The deadline for application is 1 February 1985. The appointment begins 1 September 1985. The award will be announced in May 1985. For further information contact:

Science, Engineering, and Diplomacy Fellows Program
American Association for the Advancement of Science
1776 Massachusetts Avenue NW
Washington, D.C. 20036

THE CHARLES BABBAGE INSTITUTE

for the History of Information Processing

The Charles Babbage Institute for the History of Information Processing was founded in 1978 with the goal of conducting and promoting historical research in the technical and socio-economic aspects of information processing. Located on the University of Minnesota campus, with the support of the information processing industry, the Institute maintains an archival center, serves as a clearinghouse for historical information, and sponsors other scholarly activities. In an effort to increase the number of qualified scholars in the field, the Institute is sponsoring a Predoctoral Fellowship and a Professional Internship.

PREDOCTORAL FELLOWSHIP 1985-86

The Charles Babbage Institute for the History of Information Processing is accepting applications for a Graduate Fellowship to be awarded for the 1985-86 academic year to a graduate student whose dissertation will address some aspect of the history of computers and information processing. Thesis topics may be chosen from, but are not limited to, the infrastructure of the information processing industry, and specific technological developments in the information sciences, including both hardware and software. Proposals which deal with the economic and organizational milieu of the developments, or with the economic, legal or social history of computing are especially encouraged.

There are no restrictions on the location of the academic institution which will be the venue for the Fellowship. Residence can be at the home academic institute, other research facility where there are archival materials, the Babbage Institute, or some combination of these. The stipend will be \$5,000 plus an amount up to \$2,500 for tuition, fees, travel, and other research expenses. Priority will be given to students who have completed all course work and have completed all requirements for the doctoral degree except the research and writing of the dissertation. However, even incoming graduate students will be considered. Fellows may reapply for up to two one year continuations of the Fellowship.

Applications should include biographical data and a research plan or design. Applicants should arrange for three letters of reference, certified transcripts of college credits and GRE scores (or their equivalents abroad) to be sent directly to the Institute.

Applicants for the Predoctoral Fellowship and the Professional Internship should send their materials to The Charles Babbage Institute, University of Minnesota, 104 Walter Library, 117 Pleasant Street S.E., Minneapolis, MN 55455, U.S.A. by January 15, 1985. No special application forms are required. Dependent upon funding one or both of these awards may be made.

PROFESSIONAL INTERNSHIP 1985-86

The Charles Babbage Institute for the History of Information Processing is accepting applications for a Professional Internship to be awarded for a period of three to nine months between June 1, 1985 and May 31, 1986. The Internship is available to professional staff interested in an introduction to the history of information processing. Appropriate applicants might include, but are not limited to, historians and social scientists interested in the history of information processing and its infrastructure, academics interested in preparing new courses in this history, or records managers and archivists interested in related archival problems.

Residence is required at the Babbage Institute, on the University of Minnesota campus. Interns are required to conduct a research project under the direction of the Institute staff. Support services include desk, secretarial and photocopy service, and telephone budget for Institute-related activities.

The stipend for the Intern Fellowship is \$1,000 per month. Interns may receive additional outside support from government, industry, or academic institutions, but must devote their full time to the history of information processing while the internship is in effect.

Applications should include biographical data, a statement of interests, a proposal of dates during which the Internship would be held, and the names, together with telephone numbers and addresses, of three references.

ANNOUNCEMENTS: HONORS

**Secretary of State's Prize for
Excellence in Interdisciplinary Research in
Canadian Studies Goes to
Alex C. Michalos**

The Philosophy Department of the University of Guelph is pleased to announce that Professor Alex C. Michalos was awarded the Secretary of State's Prize for Excellence in Interdisciplinary Research in Canadian Studies for his North American Social Report (a comparative study of the Quality of Life in Canada and the USA from 1964 to 1974). The five volumes of the treatise were published by D. Reidel as Foundations, Population and Health (1980), Crime, Justice and Politics (1980), Science, Education and Recreation (1981), Environment, Transportation and Housing (1981), Economics, Religion and Morality (1982).

ANNOUNCEMENTS: NEWSLETTER AVAILABLE

Uppsala Newsletter/History of Science

Uppsala Newsletter an occasional publication, plans at least two issues a year. It is an attempt to give surveys and information about the field in Scandinavia. Although there is no Scandinavian society for History of Science, correspondents are in most university towns and through them they hope to reflect what is going on in actual research.

The Newsletter will of course use the history of science in a broad sense, including also the history of medicine and history of technology. It will be sent without cost to anyone interested. Inquiries and information should be sent to the Editor:

Tore Frängsmyr, Editor
Office for History of Science
Uppsala University
Box 256, S-751 05
Uppsala, Sweden

ANNOUNCEMENTS: NEW SOCIETY PROPOSED**Proposed Literature and Science Society**

The Modern Language Association Literature and Science Division has formed a subcommittee to investigate interest in establishing a society to facilitate research and exchange of information in Literature and Science studies. The proposed society would establish a public forum for work exploring a wide range of relationships among science, technology, literature and the arts. A society-supported journal or newsletter, which would serve as a permanent home for the division's annual bibliography, is also under discussion.

If you have any suggestions concerning the goals of the proposed society, or wish to indicate an interest in participating, please write to the subcommittee chair. (Other subcommittee members are Mark Greenberg, Stuart Peterfreund, George Rousseau, Joseph Slade, Stephen Weininger and David Wright): Lance Schachterle, Humanities, WPI, Worcester, MA 01609.

ANNOUNCEMENTS: DIRECTORY OF ETHNOGRAPHIC WORK**Network for the Ethnographic Study of
Science, Technology and Organizations**

The Network for the Ethnographic Study of Science, Technology and Organizations (NESSTO) is compiling a directory of people from industry, government and academe doing ethnographic work in advanced industrial societies. Please send name, address, phone number, computer net address, affiliation(s), education, and a description of your current activities and research interests (approximately 50-100 words), underlining five key words. Please respond by September 15 and send to NESSTO, P. O. BOX 11442, Stanford, CA 94305. Listing is free. Enclose a \$3.00 contribution for a copy of the directory (checks payable to NESSTO).

DEADLINE FOR MATERIALS TO BE PUBLISHED IN 4S REVIEW

Volume 2:#3-----1 September 1984

Volume 2:#4-----1 December 1984

Volume 3:#1-----1 March 1985

Volume 3:#2-----1 June 1985

4S REVIEW

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4S REVIEW is sent to all members of the **Society for Social Studies of Science**; membership is on a calendar year basis. There are three categories of membership: **Professional**, \$15; **Students**, \$5; **Institutional** (including libraries), \$25.

Correspondence concerning membership and subscriptions should be sent to:

J. Scott Long
4S Secretary
Department of Sociology
Washington State University
Pullman, Washington 99164

Correspondence concerning manuscripts for publication, reviews, opinions, and news should be sent to the appropriate editor:

Jerry Gaston, Department of Sociology, Texas A&M University,
College Station, Texas 77843

Lawrence Stern, (Book Reviews), Department of Sociology, Texas A&M University,
College Station, Texas 77843

Steve Woolgar, (News), Department of Sociology, Brunel University,
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Richard Gillespie, (News), Department of History and Sociology of Science,
University of Pennsylvania, Philadelphia, Pennsylvania 19104

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4S REVIEW

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