ISIS

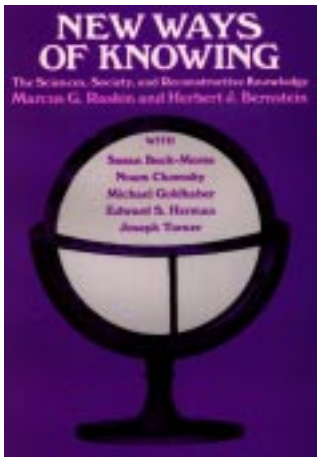
Catalog of Publications *and* Presentations

Volume 1, Spring 1999

BOOKS

New Ways of Knowing: The Sciences, Society, and Reconstructive Knowledge

Marcus G. Raskin, Institute for Policy Studies, and Herbert J. Bernstein, Hampshire College (contributions also from Susan Buck-Morss, Noam Chomsky, Michael Goldhaber, Edward Herman and Joseph Turner)

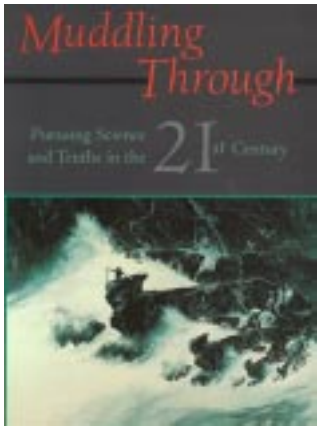


Although the need to limit and control our runaway technologies is widely recognized, the current debate on this subject is primarily concerned with technical questions that largely overlook the social and ethical issues at the heart of the knowledge process. Noted physicists and social scientists challenge the paradigm of scientific thinking whose applications can prove destructive to existing social systems. They shift the debate to the need for a radical change of direction that would replace traditional "value-free" inquiry and research with a knowledge model that incorporates social responsibility, democratic principles and comprehensive ethical standards. *Rowman & Littlefield, 1987. Autographed paperback, $30*

Muddling Through: Pursuing Science & Truths in the Twenty-First Century

Michael Fortun, ISIS, and Herbert J. Bernstein, Hampshire College

For most people, understanding the sciences means familiarity with the end products of science—a new drug, a new theory of the cosmos, yet another technological advance. But the fascination with and emphasis on these end products obscures the processes that underlie every stage of scientific inquiry from the earliest posing of a question, to the application of scientific truths, to many of our most urgent and complex social problems. In their provocative new book, Mike Fortun and Herbert J. Bernstein advocate a new approach to the sciences of the twenty-first century based on the processes scientists and the sciences actually follow: "muddling through," the combined operations of language, experiment and human social judgments. The authors draw on historical events, the writings of scientists and cutting-edge science to convey the complex interactions that determined how and why ideas, experiments and expert interpretations are shaped into truths that are at once messy and reliable, ambiguous and robust, incomplete and illuminating. *Counterpoint Press, 1998. Autographed hardcover, $30*



SEMINARS

Theories of Knowledge

Humans, Rocks and Computer Programs

Charles H. Bennett, IBM

IBM fellow, inventor and leading physicist who coined the term "quantum teleportation," Charles Bennett discusses complexity, evolution and the whole world in a quest for an answer to the question, "What happens when a self-organizing system organizes itself?" *February, 1998. Audio. $5*A Discussion on

Participatory Research

Herbert J. Bernstein, Hampshire College

Participatory research is composed of three basic components: relational, critical and analytical knowledge. Analytical knowledge is an awareness of what "is," of facts surrounding an issue. Critical knowledge considers values associated with an issue and relational knowledge looks at the various perspectives of the land, individuals and community. Taken together, the components form a compelling cross-disciplinary model for research and interaction today. Facilitated by ISIS founder and President, Herbert J. Bernstein, a roundtable discussion addresses methodologies, practical results, challenges and limits in participatory research. *January, 1996. Audio. $5*

The Life and Thought of David Bohm: Development of the Notion of Dialogue

Sarah Bohm and Lee Nichol, Ojai School

Sarah Bohm, the late David Bohm's wife, gives deep insight into the nature of a great mind and what drove him. In effect, Sarah synthesizes Dr. Bohm's thoughts and puts the ideas in context with the individual. She explains Dr. Bohm's quest for solutions to economic ailments, how they led him to science, and discusses the events that drove him to develop his theories about dialog. Mrs. Bohm then turns the discussion over to Lee Nichol, who elucidates the inner workings of David Bohm's Dialogue. *June, 1995. Audio, two tapes. $7.50*

Scientists' Dialogue Initiative: Intro to Dialogue

Sarah Bohm, Lee Nichols, Ojai School and Herb Bernstein, Hampshire College

A workshop on dialogue, addressing the need for a new, robust communication between members of the scientific community. Inspired by work from the late David Bohm, quantum physicist, philosopher and dialog theorist pioneer. *June, 1995. Video. $7.50*

Comparative Scientific Traditions

Sandra Harding, University of Delaware

What role does culture play in the focus and interpretation of scientific data? Sandra Harding, world-famous feminist philosopher of science, leads a roundtable discussion analyzing the impact of belief systems upon scientific inquiry. *April, 1994. Video. $7.50*

Politics & Knowledge in a Post-Liberal Age

Marcus Raskin, Institute for Policy Studies

Is there a crisis in modern inquiry? How do we decide what is true? Who gets to tell us what to do? Marcus Raskin leads a discussion on the need for constructing new "paths" of knowledge

grounded in problem-based inquiry, rather than disciplinary-restricted research. Can we move from colonizing knowledge to knowledge for reconstruction? *December, 1996. Audio, two tapes. $7.50*

Mother Earth/ Father Son: Cultural Intuition & Codified Knowledge

Tacheeni Scott, Northfield State University, University of California

What trials does a Native American face in the current culture and what can be learned from the Native American tradition of whole earth? With wit and wisdom, Tacheeni Scott employs anecdotes, personal experience in teaching and attending college, as well as stories in the Navaho tradition to illustrate where western culture finds common grounds with Native American philosophy. *February, 1998. Audio. $5*

Applied Science and Ethics

Economic Development: Exploring the Values and Ethics of Assistance and Intervention

Jane Benbow, *CARE International*

Jane Benbow, international mediation consultant, shares her model/guide for economic intervention and leads the listener through a thinking exercise to clarify values. She critically deals with the issue of intervention, admitting that it always imposes the intervener's ethical system. With this acknowledgment, she gives three steps to enable individuals to intervene with integrity and consciously act against oppression. *March, 1994. Audio. $5*

Judges, Experts and Science: What Should the Law Allow?

Mark Bernstein, Court of Common Pleas, Philadelphia, PA

One scientific expert claims evidence for the plaintiff and another argues for the defendant. Who determines scientific fact in the courtroom? Currently, judges act as scientific gate keeper, deciding which findings are tenable and therein admissable in court. Yet judges are only human. As lay people, they must decide between competing experts often equally qualified and respected in their respective professions. The implications of their choices go on to affect the fabric of accepted science. The presumption that science is black and white has grave implications for scientific thought and interpretation. The honorable and respected Judge Bernstein discusses the difficulty between science and law, providing an informative history and enlightening court cases to justify his claim that science should be distinguished by jury, not legal profession. *November, 1997. Audio. $5*

Ethical Dilemmas Arising from Scientific Research: A Personal History

Arthur W. Galston, Yale University

Dr. Galston is the renowned chemist whose research led to the formulation of the herbicide, Agent Orange. During the Vietnam War, Agent Orange was used extensively as a defoliant and later became the focus of a lawsuit by Vietnam Veterans who claimed numerous negative health effects as a result of exposure to the herbicide. Dr. Galston reflects on his staunch opposition to the military's herbicide program, expert testimony and work to terminate the program in a personal journey that is both instructive and captivating. *August, 1997. Audio. $5*

Taking Population Out of the Equation

Pat Hynes, environmental engineer

Pat Hynes proposes a new model for environmental policy: Delete population from the equation and replace it with the structural causes of environ-

mental degradation. A result of the proposal is removing women from the equation as either subjects or objects of population policy. In proffering the new model, Hynes defies number-crunching analysts and places both women's human rights and environmental justice at the core of the environment/development debate. *October, 1993. Audio. $5*

Reflections on Memory & Memorization: Hiroshima, Nagasaki and The Nazi Holocaust

Richard Minear, University of Massachusetts

This powerful seminar calls for the responsibility of history. Richard Minear equates the Hiroshima and Nagasaki bombing to the Holocaust, but shows how the correlation has been largely ignored due to the fact that history has been shaped by victors. Richard Minear discusses the lack of public memory towards the bombings and instills greater awareness by reading poems of personal accounts from the bombings and also calling into question conventional history and perceptions of the past. *November, 1994. Audio. $5*

Public Space, Racism and the Construction of Privilege in United States Healthcare

Helan Page, University of Massachusetts

African Americans are in need of more healthcare than any other demographic. Yet, there is a startling resistance in the African American community toward health services. While the issue of adequate access to medical facilities is a current and needed debate, the underlying antagonism of the medical community goes largely unchallenged. With 33% of African Americans not fulfilling prescriptions, the question must be raised as to why there is general mistrust?

Helen Page, professor of anthropology at the University of Massachusetts, points towards gruesome and deceptive medical studies in decades past that perpetuate reluctance to participate in current research. Remnants of racism still pervade modern medical thought, as well, and many object to the general lack of respect healthcare professionals afford African American bodies. Reluctance to participate and ill treatment from medical professionals culminate in a deadly trend, one that requires careful reconsideration in the forging of an equitable solution. *February, 1994. Audio. $5*

Faith & Reason

Chancellor David Scott, University of Massachusetts

The Enlightenment marked a change where a belief system based on faith and religion was replaced by rational inquiry. Although the transformation led to spectacular and unprecedented results in knowledge generation and application, it has also resulted in a sense of disillusionment with the methods and products of scientific inquiry. The habit of viewing faith and reason as irreconcilable extremes and of forcing society to choose between them has led to a loss of spirituality and sense of community, as well as a fragmentation of scholarship within the academy. Postmodernism is part of a new transformation which seeks a more synthetic and integrative approach to knowledge. But postmodernism may have significant limitations when applied to science. Chancellor Scott addresses these issues, which are of paramount importance since they influence curricula and the general view of universities and colleges in the approaching decades. *January, 1997. Audio, two tapes. $7.50*

Ethics, Statistics and the Myth of Objectivity

Mike Sutherland, Statistical Consulting Center, University of Massachusetts

A major stumbling block when conducting research is wrestling with one's own presupposition of reality. How well has one measured what one thinks one has measured? How well can one quantify the sorts of variables that one deems important in understanding the system? Data may be silly and weird, not only counter to a proposed theory but following a system unimagined. If an absolutely clear conception of the data is not present before collection, erroneous inferences can lead to misleading and incorrect results. Employing amusing anecdotes and a wealth of experience, Mike Sutherland discusses the subjectivity of statistics and warns against blindly forming hypothesis from random or irreconcilable data. *May, 1994. Audio. $5*

Science and Equality

Science & the Inner Sanctum: Why is Physics So Exclusive?

Mary James, Reed College

The roots of modern science include the mysticism of Pythagoras, Newton and Galileo. What do they have to do with the current trends in science? Recent studies show a strong connection between traditional culture and the fact that most science (especially physics) is dominated by Eurasian males. Professor Mary James explores how the private and professional socialization of scientists affects both the world of science and the next generation of scientists. Hampshire College alumna Mary James, recently voted the "Best Physics Teacher in America" by *Rolling Stone* magazine and the first African-American woman to present an invited talk on accelerator physics to the American Physical Society, deftly disseminates the alarming cultural bias in the scientific community. *November, 1997. Audio. $5*

Pythagoras, Religion, Women and Science: How History Shapes Knowledge

Margaret Wertheim, author

Author of *Pythagoras' Trousers*, science educator and TV producer, Margaret Wertheim holds degrees in physics and computer science. In this lively seminar, Wertheim discusses the connections between religion and science, offering an explanation for why there are so few women in science today. *February, 1996. Audio. $5*

SCIENCE IN THE WORLD

Environmental Science

Integrated Pest Management

William Coli, University of Massachusetts; Risa Silverman, Community Initiative for Sustainable Agriculture; and Vicki Van Zee, Sustainable Learning Communities

Two seminar leaders and a mediator work to help explain the intricate methods of integrated pest manage (IPM), which goes beyond the popular notion of using predators against pests. They discuss the economic viability of IPM and local programs that are implementing it. They also cover how IPM has worked and where it has failed, as well as showing interesting ways in which IPM can, and hopefully will, develop. *February, 1996. Audio, two tapes. $7.50*

Peruvian Andes: Indian Land Rights, Genocide & Democracy

Søren Hvalkof, anthropologist

The Peruvian Andes, by the upper Amazon, support a substantial and highly diverse indigenous population. The Andes are also highly fertile and well suited for agriculture, bringing indigenous tribes of the region in direct conflict with industrialized nation states. What should be done with the indigenous tribes? Setting up reservations, enacting agrarian reform and a

combination of the two have all proved inadequate, since under all three systems tribes are subject to external social control. States have territories, but indigenous populations have no such legal tool. The question becomes a case of land rights, whether corporations and states may dictate language, culture and policy or it be left to the superindividual. Danish Anthropologist Søren Hvalkof weaves historical context with current philosophical debate in a talk accessible to both the layperson and professional. *February, 1996. Audio. $5*

Wind Energy: Prospects and Problems in a New Environment

Jim Manwell, University of Massachusetts

Wind power could make significant contributions to the world's energy supply in the near future. Nevertheless, there are many obstacles to the realization of that potential. Jim Manwell considers the prospects for wind energy in light of the "absence of a sane" national energy policy, "free market" utility economics, the limits of current technology, the battle over non-private land use and general public perceptions. The seminar focuses on the specific case of the Mount Tom Wind-Turbine Project which Manwell's research laboratory has been trying to work out for several years. The technical and "people" problems, as well as the politics and potential benefit, make for a lively lecture. *November, 1995. Audio, two tapes. $7.50*

General Science

Life of the Cosmos

Lee Smolin, Penn. State University

Famous physicist Dr. Lee Smolin discusses current developments in physics and cosmology. Presented is a lively lecture on the *big* questions, including why the universe is hospitable to life, if the big bang or something before it was the beginning of all life, and the general nature of the building blocks of the universe. Based on his recent world-renowned book, *The Life of the Cosmos*, Dr. Smolin examines where science stands presently in the search for answers to recent observational and theoretical developments. A Hampshire graduate, now Professor of Physics at the Center for Gravitational Physics and Geometry at Penn. State University, Dr. Smolin is author of more than 80 scientific papers and a leading contributor to the field of quantum gravity. *October, 1997. Audio. $5*

Genomics

After the Human Genome Project

Michael Fortun, ISIS

The Human Genome Project, a government-sponsored project to map and sequence all of the human chromosomes, was always supposed to help ensure competitiveness in the U.S. biotechnology industry. Is the plan working out, now that the first "genomics-based" corporations have hit the stock exchanges? What kinds of information, organisms, substances and things in between are being bought and sold today? While Dolly the cloned sheep was grabbing headlines, Mike Fortun was working quietly behind the scenes at a biotechnology industry conference in San Francisco, researching changes in the science and business of human genetics. *April, 1997. Audio, two tapes. $7.50*

The Human Genome

Michael Fortun, ISIS

The Human Genome Project promises to unlock the power of genetics with a detailed mapping of the human chromosome. From the chromosome, cures for disease and biological predispositions can be culled. But how exactly is the gene sequence mapped and what issues are scientists facing as they uncover the human instructional manual?

Mike Fortun, Founding ISIS Fellow and science historian, demystifies the Human Genome Project and attempts to address social implications for a genetic society in the twenty-first century. *March, 1992. Audio. $5*

Time, Busy Bodies and the Habit of Becoming Genetic

Michael Fortun, ISIS

"We currently have a particularly intimate relationship to genes, getting closer by the day, and the desire for this type of intimacy is something which remains to be theorized and pragmatically enacted. To become genetic does not mean forsaking the social for the biological, to submit to geneticization, but somehow to deterritorialize the human body." Science historian and ISIS Founding Fellow Mike Fortun disseminates the major social implications of genetics in the Twenty-First Century. Also available as paper. *August, 1994. Audio. $5*

Public Hearing by the Special Committee on Genetic Information

With the Human Genome Project nearing completion, science and government must prepare for the ramifications of individual gene mapping. Should insurance companies have access to genetic records? Who owns genetic information for the deceased? Will genetic testing become a fixture of modern medical practice? If so, when? Scientists and concerned individuals from Western Massachusetts testify and answer questions before the Special Committee on Genetic Information. *September, 1996. Audio. $5*

Multiple Chemical Sensitivities

Multiple Chemical Sensitivity (MCS) is a largely unrecognized disorder agitated by many household chemicals. Individuals suffering from MCS may find petroleum chemicals, fabric softeners, paints, perfumes and a plethora of other common chemicals hazardous.

MCS Conference on Safe Housing

Building contractors specializing in MCS discuss specific ways to remodel housing for individuals with MCS, potential chemical hazards and other housing issues relating to what some call the "invisible" disability. *June, 1997. Audio, two tapes. $7.50*

MCS Diagnosis and Treatment

Amherst, Massachusetts physicians specializing in MCS discuss specific symptoms, reactivity and current medical issues relating to what some call the "invisible" disability. *February, 1997. Audio, two tapes. $7.50*

MCS Inaugural Conference

Held in Seattle, Washington, the first annual Multiple Chemical Sensitivity Conference presents case studies, diagnosis, MCS history and current medical findings relating to what some call the "invisible" disability. *Audio, four tapes. $15*

Indoor Air Quality

Jack Spengler, Howard School of Public Health

The mechanics of indoor air pollution are disseminated and discussed, highlighting the unseen danger of contamination in today's technological, industrial world. Dr. Spengler is the foremost authority on the health effects of indoor air quality. *April, 1997. Video. $7.50*

Multiple Chemical Sensitivity: A Conference Primer

Karen Sutherland

Treated by many major medical centers, MCS is nonetheless an "invisible" disorder with low awareness and only partial recognition as a legitimate condition. Karen Sutherland hosts an ISIS sponsored conference addressing many challenges facing individuals with MCS Basic information, legal issues, support groups and lack of awareness are just some of the topics covered. *March, 1994. Audio, two tapes. $7.50*

Northeast Federal Facilities Cleanup Workshop
July, 1997, Amherst, Massachusetts

Community Participation in the Cleanup Process: Principles of Partnership

Lenny Siegel, Center for Public Environmental Oversight

Environmental cleanup requires cooperation and an awareness of various perspectives. Lenny Siegel, pioneer, developer and father of modern cleanup workshops, discusses practical strategies for constructive cleanup efforts as pertaining to environmental work and the Northeast Federal Facilities Cleanup in particular. This audio cassette is also available as part of the Workshop audio collection. *July, 1997. Audio. $5*

Environmental Justice: Economic Convergence for the Local Workforce

Haywood Turrentine, District Council for Labors Union

Shutting down an environmentally unsafe government facility often translates into a depression in the local economy. Haywood Turrentine discusses environmental justice, regulations and solutions to curbing economic slowdown in toxic cleanup areas. This audio cassette is also available as part of the Workshop audio collection. *July, 1997. Audio. $5*

The Use of Human Health and Ecological Risk Assessments in Cleanup Decision-making

Ted Schettler, M.D., University of Concerned Scientists

Risk assessment is accurate, but not necessarily valid. Among other considerations, risk assessment is also unquestionably biased by ethics. Well known speaker Ted Shettler explains the pitfalls and advantages of risk assessment in general and as applied to toxic cleanup efforts. This audio cassette is also available as part of the Workshop audio collection. *July, 1997. Audio. $5*

Workshop Complete Audio Collection

Environmental justice, community participation, ecological risk assessment and many other topics compose the complete audio collection of the 1997 Northeast Federal Facilities Cleanup Workshop. *July, 1997. Audio, nine tapes. $20*

Northeast Federal Facilities Cleanup Workshop Video

Contains seminars presented at the Northeast Federal Facilities Cleanup Workshop. *July, 1997. Video. $7.50*

PAPERS

Reconstruction and Its Knowledge Method

Marcus G. Raskin, Institute for Policy Studies

August, 1987. Paper. $5

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Idols of Modern Science and the Reconstruction of Knowledge

Herbert J. Bernstein, Hampshire College

August, 1987. Paper. $3

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Toward a Reconstructive Political Science

Marcus G. Raskin, Institute for Policy Studies and Herbert J. Bernstein, Hampshire College

Knowledge is thoroughly political itself and crucial to social decisions. Power and knowledge are virtually synonymous. Every issue requires investigation not merely of the scientist's object of study (or of the technologist's production) but of the entire relationship between the knowledge worker and the object. Marcus Raskin and Herbert Bernstein discuss their conception of a "political science," a term borrowed to denote science suited to historical condition. *August, 1987. Paper. $5*

Nuclearism and Modern Knowledge

Herbert J. Bernstein, Hampshire College

The model of "it works" forms a crucial element of the technocratic approach to many of the disciplines of knowledge. If Heisenberg's Uncertainty Principle signals a shift from deterministic to probabilistic theory and we are ultimately constructing our own reality, can science be value free? If not, isn't it morally imperative to mold science in a holistic, responsible direction? *Paper. $3*

Information Transfer with Two-State, Two-Particle Quantum Systems

Anton Zeilinger, University of Innsbruck, Austria; Herbert J. Bernstein, Hampshire College; and Michael A. Horne, Stonehill College

Any future Quantum Information Machine will contain unitary operators and entangled particle states. The Hilbert space describing the action of the Quantum Information Machine separates into a bosonic and a fermionic sector. Because of the fact that the bosonic sector is of higher dimension, it is always possible to encode more information into a multi-boson-state than into a multi-fermion-state, given the same complexity (i.e. unitary representation) of the Quantum Information Machine. This is explicitly studied for the case of two particles defined in two modes. There, the beam-splitter is a generic representation of any U2-matrix and it has recently been shown that one can realize any n-dimensional unitary

operatorby successive application of such 2-dimensional operators. The 2-boson, 2-mode Hilbert space is of dimension 3, and thus one can encode log23 = 1.57 bits of information into such an entangled state. Finally, some explicit schemes for creating and detecting the possible 2-photon, 2-mode states spanning the bosonic Bell basis are given. *Paper. $3*

Smallpox in Two Systems of Knowledge

Frederique Apffel-Marglin, Smith College

Dr. Apffel-Marglin challenges western science's tenuous claim to superiority established through unassailability. Dr. Apffel-Marglin examines the sociological reaction to the smallpox virus, contrasting non-western culture with western science. Utilizing Derrida's deconstructive method, the paper "challenge[s] the project of modernization." *June, 1988. Paper. $3*

Aspects of Radical Constructivism and its Educational Recommendations

Ernst von Glasersfeld, philosopher

Radical Constructivism is the theory that reality is inherently subjective. An ulterior reality may exist, but objective identification is inaccessible to human perception. Since reality is subjective to each individual, common representations of human experience must be relied upon for the conveyance of knowledge among individuals. Radical Constructivism poses obstacles to the transmission of more abstract knowledge, such as mathematics. Various techniques are briefly discussed, including the need to identify each student's frame of reference. *August, 1992. Paper. $3*

Scientists and the Legacy of World War II: The Case of Operations Research

Michael Fortun, ISIS and S. S. Schweber, Brandeis University

It is clear why the contributions of physicists during World War II were central in the successes of radar, sonar, fuse proximity and the atomic bomb. It is not so clear what they contributed to Operations Research (O.R.), Systems Engineering (S.E.) and which of their skills were particularly relevant to such developments. Science historian Mike Fortun attempts to answer that question for O.R. In the process, a brief look is taken at the history of O.R., Taylorism and the comparative developments of the United States and United Kingdom. The relation between O.R. and S.E. is also discussed, as well as how authority is appropriated and how differing contexts shaped the U.S. and U.K. *1993. Paper. $3*

Differences in Opportunistic Infection Rates in Women with AIDS

Michelle M. Murrain, Hampshire College

Due to the paucity of information regarding the natural history of HIV infection in women, this study investigates possible differences in rates of opportunistic infections in women and men with AIDS. To accomplish this, an analysis of existing AIDS cases from the Centers for Disease Control AIDS Surveillance Dataset was carried out. *1993. Paper. $3*

Bell Theorem Without Inequalities for Two Spinless Particles

Herbert J. Bernstein, Hampshire College; Daniel M. Greenberger, CUNY; Michael A. Horne, Stonehill College; and Anton Zeilinger, University of Innsbruck, Austria

We use the Greenberger-Horne-Zeilinger approach to present three demonstrations of the failure of Einstein-Podolsky-Rosen (EPR) local realism for the case of two spinless particles in a two-particle interferometer. The original EPR assumptions of locality and reality do not suffice for this. First, we use the EPR assumptions of locality and reality to establish that in a two-particle interferometer, the path

taken by each particle is an element of reality. Second, we supplement the EPR premises by the postulate that when the path taken by a particle is an element of reality, all paths not taken are empty. We emphasize that our approach is not applicable to a single-particle interferometer because there the path taken by the particle cannot be established as an element of reality. We point out that there are real conceptual differences between single-particle, two-particle and multiarticle interferometry. *January, 1993. Paper. $3*

Clinical Ecology and the Judicial Construction of Expertise

Saul Halfon, legal advisor for the chemically injured

Known more recently as environmental medicine, Clinical Ecology is based on the premise that chronic or acute exposure to a variety of environmental toxins can cause immune system dysregulation in particularly susceptible individuals. Relying heavily on inductive reasoning and based upon strictly empirical observation, in the late Eighties clinical ecology was all but discredited by the courts due to a lack of causal mechanisms. Saul Halfon discusses the history of clinical ecology and its tangle with the courts, writing about its failures in the past and preferring possible solutions for the future of its offspring, environmental medicine. *September, 1993. Paper. $3*

Time, Busy Bodies, and the Habit of Becoming Genetic

Michael Fortun, ISIS

"We currently have a particularly intimate relationship to genes, getting closer by the day, and the desire for this type of intimacy is something which remains to be theorized and pragmatically enacted. To become genetic does not mean forsaking the social for the biological, to submit to geneticization, but somehow to deterritorialize the human body." Science historian and ISIS Founding Fellow Mike Fortun disseminates the major social implications of genetics in the Twenty-first Century. Also available as a seminar audio cassette. *June, 1994. Paper. $3*

Experimental Realization of Any Discrete Unitary Operator

Michael Reck and Anton Zeilinger, University of Innsbruck, Austria; Herbert Bernstein and Philip Bertani, Hampshire College

An algorithmic proof that any discrete finite-dimensional unitary operator can be constructed in the laboratory using optical devices is given. The recursive algorithm factorizes an N x N unitary matrix into a sequence of two-dimensional beam-splitter transformations. The experiment is built from the corresponding devices. This also permits the measurement of the observable corresponding to any discrete Hermitian matrix. Thus, optical experiments with any type of radiation (photons, atoms, etc.) exploring higher-dimensional discrete quantum systems becomes feasible. *July, 1994. Paper. $3*

Military Waste: Terrain Conductivity Investigation of Landfill B Leachate Plume, Westover Air Reserve Base, Massachusetts

Amherst College Geology

Terrain conductivity studies were conducted to determine the possible sources and extent of contamination from landfill sites at the Westover Air Reserve Base. Informative maps included. *December, 1994. Paper. $5*

The Trial of Herbert J. Bernstein, Physicist

Hampshire College 25th Anniversary Alumni Reunion, June 25, 1995

In a whimsical, easy-to-follow language that is suitable for both expert and lay-reader, physicist Herbert J. Bernstein is

placed in front of a mock trial on charges of writing a paper that could have negative social implications in the future, namely his paper in *Physical Review Letters* on "Experimental Realization of Any Discrete Unitary Operator." Presented as a dialog, the question is whether science has a social responsibility to censor its discoveries. If so, to what degree and by whose standard? In the process of debate, simple explanations to quantum teleportation and other theoretical phenomena are also discussed. *June, 1995. Paper. $5*

Concentrating Partial Entanglement by Local Operations

Charles H. Bennett, IBM; Herbert J. Bernstein, Hampshire College; Sandy Popescu and Benjamin Schumacher, Kenyon College

If two separated observers are supplied with entanglement in the form of n pairs of particles in identical partly entangled pure states, one member of each pair being given to each observer, they can, by local actions of each observer, concentrate this entanglement into a smaller number of maximally entangled pairs of particles. For example, Einstein-Podolsky-Rosen singlets similarly shared between two observers. The concentration process asymptotically conserves entropy of entanglement—the von Neumann entropy of the partial density matrix seen by either observer—with the yield of the singlet approaching, for large n, the base-2 entropy of entanglement of the initial partly entangled pure state. Conversely, any pure or mixed entangled state of two systems can be produced by two classically communicating separated observers, drawing on a supply of singlets as their sole source of entanglement. *August, 1995. Paper. $3*

Sixty-five Roses, Pulmozyme, Steve Shak, Genentech

Michael Fortun, ISIS

Fortun interviews Steven Shak, leading scientist in the discovery and development of Pulmozyme, a treatment for clearing the mucous from the lungs of individuals with cystic fibrosis. Even more than a history of Pulmozyme, though, it is the story of a young scientist doing science and the important questions that arise as a result. *1997. Paper. $3*

The Responsibility of Language Teachers

Tom Roeper, University of Massachusetts

The essence of a responsible language teacher is to convey truths about language. The most crucial truth is that language is not thought. If teachers cannot convey that one simple truth to their students, then society runs the risk of replacing race prejudice with language prejudice. Differences in dialect need to be stressed as a cultural manifestation rather than an indication of intelligence. Black English is especially in need of social acceptance since, in fact, it exhibits proper linguistic structure. Roeper argues that until dialects are perceived as on equal footing with "Standard English," true pluralism may not be achieved. Language teachers, in particular, are in the unique position to facilitate the process of reform. *Paper. $3*

Genetic Programming for Quantum Computers

Lee Spector, Howard Barnum, and Herbert J. Bernstein, Hampshire College

Genetic programming can be used to automatically discover algorithms for quantum computers that are more efficient than any classical computer algorithm for an identical problem. Lee Spector, Howard Barnum and Herbert Bernstein present the first evolved, better-than-classical quantum algorithm, one for Deutsch's "early promise" prob-

lem. Also demonstrated is a technique for evolving scalable quantum gate arrays. Other issues in the application of genetic programming to quantum computation, and vice versa, are discussed. *Paper. $3*

Quantum Teleportation and 'The Willies': Ethnography of Entangled States

Michael Fortun, ISIS

Dr. Fortun again investigates the scientists' role of responsibility in the aftermath of their science. This time he is reenacting the Trial of Herbert J. Bernstein and the case of a possible contract with the Department of Defense. Dr. Fortun presents the reality of quantum teleportation and the myths surrounding it that have come from science fiction, also showing how Herbert Bernstein's own work is entangled in the whole mess on the historical and cultural level. *July, 1998. Paper. $5*

THE INSTITUTE FOR SCIENCE & INTERDISCIPLINARY STUDIES

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