Science, Technology & Society

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USING COMMUNITY RESEARCH PAPERS IN TEACHING THE HISTORY OF TECHNOLOGY

For the academic year 1982-83 I was offered the opportunity to teach two sections of the undergraduate survey in the history of technology at New Jersey Institute of Technology in Newark. As a curator in the National Park Service, but trained as a historian of technology, I jumped at the chance to do some collegiate level teaching in my field. The course is an upper-level survey (juniors and seniors) designed to fulfill basic humanities requirements for engineering and architecture students. The content of the course and its structure was left entirely up to me. Rather arbitrarily I broke the two semester survey into two discrete segments. The first semester covered technology from prehistoric times to the early 19th century and focused entirely on Europe and Asia. The second semester was then a survey of the history of technology in America, roughly from 1800 to the 1930s. As it turned out, because of bureaucratic restrictions in the way NJIT students enroll in humanities electives, very few students were allowed to take both semesters (only one managed to do so). In reality, then, each semester stood alone, independent of the other.

As a curator I purposely decided to emphasize the fact that technology and engineering have as their endproducts artifacts. Material culture was emphasized throughout. In the first semester, approaching the survey from this viewpoint proved difficult, if not at times futile. As much as I would have liked to do so, I could not take sixty students on a weekend field trip to Rome or England. Resources even as close as New York museums proved untappable. Most students at NJIT are putting themselves through school and have evening and weekend jobs. Many others especially in the evening section are employed at technical jobs and are working toward a formal engineering degree. Slides and a short introductory "artifact lab" were used to press home the point of the material culture side of the history of technology. The first semester turned out to be a standard textbook approach with the traditional book review "term" paper designed to broaden their reading in history.

For the Spring semester, however, I felt that as a historian of 19th-century American technology and as a curator of a major historical collection I should provide the students with a different perspective. But how? Mandatory field trips and sessions at the museum in West Orange were still out of the question for the same reasons as in the first semester, although optional trips might be possibilities. The first semester had shown that the traditional book review paper was

not only boring to read and grade but rarely stimulated the student's full intellectual capabilities. There had been one major exception to the papers in the fall. One student had asked permission to do not the regular book review paper, but instead a paper analyzing a Newark cathedral as an example of a modern American version of Gothic style. The paper was energetic and interesting principally because the student was personally fond of the church. The structure meant a great deal to him as a religious symbol. From this cue I set out to restructure the second semester's assignment.

In the revised assignment I asked the students to go out into their local community and research the history of an artifact, person, or structure. The fact that over 95% of the students at NJIT are commuters makes this approach particularly appropriate and applicable. New Jersey offers a wealth of industrial and architectural resources for such a study, and New York city is only a short drive or train ride away.

The project was structured with restrictive terms. First, the subject of the paper had to be extant in the student's present community. This was to prevent general histories of the automobile or general studies of society and technology in 20th-century New Jersey, etc. The proof of this rested with the students, for the final paper was to include a current photograph of the subject taken by the student. Second, the significant dates of the topic (construction, main period of use, or employment) were to predate World War II or, at the very least, the student's own birthdate. Third, museum objects at local historical societies and museums were off limits. The subject of the project was to be something or someone still very much a part of the community of the student. Oral history, in which the focus of the project would be a person --engineer, mill worker, craftsman-- was encouraged, but with the added restriction of turning in unedited transcripts or audio tapes of the actual interviews.

As exciting as all this looked on paper when I first devised it, I was concerned about several aspects. Would the students find the assignment incomprehensible? Would they balk at submitting photographs? Could they do local history, which is essentially what I was requiring? Would they *learn* anything by doing this? Their work needed to be monitored, guided, and made relevant to a survey of the history of technology in America.

In order to provide a structure to the project, I developed a form sheet called the *Project Progress Sheet* on which the students would report various stages of the project before the final submission. This progress sheet was turned in twice. The initial time was at about four weeks into the semester, at which point the students indicated the subject of their research and significant data relative to it. All topics were subject to my final approval. The second time at which the students turned in the sheet was about four weeks prior to the deadline for the paper. At this time the students indicated probable sources of information, the format of the photograph (black and white, color print, color slide, etc.) and any problems that might be cropping up along the way. This progress sheet made the student commit to a topic early enough into the semester to allow time for completion. It also gave me a chance to monitor their work. By requiring two submissions before the final paper, the students were encouraged to plan ahead and not get caught near the end of the term with six weeks of work to do. The sheet worked. Not only did I not have to track down student papers (only 2 of 65 were late), but the sheet seems to have helped the students to organize their work better. Generally I found the papers of the second semester, when compared to those of the first semester, to be better focused, better organized, slightly better written, and far more energetic.

The basic format limits were 4 to 7 typed pages of narrative, with either footnotes or a list of sources, and the one required photograph. Most were 7 to 10 papers with *multiple photographs*, both current and copies of historical views. Some were many more pages, with *pages* of pictures, maps, schematics, and diagrams. Only one offered an audio cassette of an interview, possibly indicating the limits of their willingness for added expenses, though more likely it represented uneasiness with oral history.

The general response of the students was very, very gratifying. Few of the projects were disappointing. Here were engineering students, architects, and managers responding to the freedom from yet another book report or term paper by aggressively delving into local history, tramping about the local New Jersey countryside, making phone calls to state and local agencies, and often patiently listening to the stories of the community's "historian" or librarian about the way things used to be. The perserverance of the students surprised me, but only less so than their perceptions. Several students, at first perplexed by the project, ended up writing engaging histories of their topics because they chose to work at it thoughtfully. Their energy came, as best as I can determine, from their selection of something which was *already part of their daily retinue*. "What about this bridge that I cross everyday?" "What about the church that I attend each Sunday?"

The range of topics, as might be imagined, was wide. Churches and schools in the local community were popular, but there were also ferry service slips, drydocks, sewing machines, a mason jar, Essex County Courthouse (Newark), the Morris Canal, an extant gas street-lighting system, etc. Since in the evening section of the course some of the students already had full time jobs, a few of the papers involved histories of their workplace or an example of the early products of the firm. For instance, one student turned in a fine piece on a Wallace & Tiernan chlorinator, a significant technology of 20th century water supply systems.

What a boon for a technological historian all these local histories represented! Of the sixty-five papers I requested that about 20% be returned voluntarily to me for my files. Originally I had intended to keep all the papers outright, but realized that retention ought to come as a request from me to individuals and as an offer by the student. The students seemed to appreciate my interest in their work and obliged my requests.

While I had stressed the project as a material culture analysis --the mason jar study being the best of that idea-- the dimensions brought to the work were many. A study of the main building of the former Curtis-Wright Propellor Division at a local airport focused on labor strife at the plant in the period just before the start of World War II. A report on the much-used Tappan Zee Bridge of the New York State Thruway Authority contained an interview with a retired gentleman who was one of the construction engineers for that bridge and many others. One of the reports on the Morris Canal, an easily researched topic here in New Jersey, went further when the student tramped through backyards in Boonton, N.J., to trace remnants of the canal and to identify remaining related structures.

The reading list for the course included an old stand-by, John Kouwenhoven's *The Arts in Modern American Civilization* (New York: Norton Library, 1967). We ended the course with a discussion of the vernacular and machine-made America and related Kouwenhoven's ideas to the class projects. As part of the course, I had also been playing historical and modern musical recordings of songs that deal with technology in American society. My aim was to provide for the students an emotional social context for the lectures and supporting color slides. The songs --even more than the initial announcement of the research assignment-- at first non-plussed the students. Although time consuming, since it sometimes took as much

as 20-25 minutes of class time per week to play the music, the introduction of songs into the classroom did establish an energetic, unconventional style to the course and to the project idea. Songs ranged from "Alabamy Bound" to the "Wreck of the Shenandoah" and several modern tunes including Gordon Lightfoot ("Steel Rail Blues") and a New Jersey folk trio called The Roches ("Factory Girl" and "Telephone Bill"). Some of the songs were taped by me directly from Edison Diamond Disc recordings in the museum's collection, but most were from commercially available recordings.

Some historians may wince at this emphasis on material culture and the built environment in a *survey* course in the history of technology. It took extra class time, and so the coverage of the course was not as broad as a more traditional approach might allow. Of course, we were able to look more closely at certain technologies which usually receive little attention in survey courses, such as the phonograph and motion pictures. Since the majority of the students were engineers, it seemed more than appropriate to emphasize the role of the engineer as designer of our built environment. Ideas and concepts are the end rewards from a survey course rather than names and dates. I think that by getting these students out into the real world to do some history I was able to sensitize them in a special way to the interaction of society and technology and to the importance of understanding the material culture of modern American society.

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Editor's Note:

A related approach to teaching the history of technology but in a slightly more rural context is contained in James C. Williams, "Local Sources for Independent Student Research," *STS Newsletter, No 34* (February 1983): 5-6.

PHILOSOPHY AND TECHNOLOGY CONFERENCE SUMMARY

A two-phase international conference on philosophy and technology was organized by Polytechnic Institute of New York in conjunction with the Society for Philosophy and Technology and held in New York, Sept. 3-7, 1983.

Phase I, which took place at the Tarrytown Hilton on the Hudson River just north of the city, consisted of twenty-two invited papers focusing on information technology and computers. In each case the speaker gave a 20-minute digest of a pre-circulated paper, which was followed by 30 minutes of discussion and exchange on the issues raised.

Topics discussed ranged from metaphysical and epistemological analyses of the character of information to ethical-political implications of the computer revolution. There appeared to be a moderate consensus (insofar as philosophers ever get involved in such things) that the technical concept of information was deficient as a category of human knowledge, and that the media hype surrounding the so-called computer revolution obscured a number of fundamental social and moral questions. As Paul Durbin (Univ. of Delaware) pointed out in the opening paper, computers and information technology are now a legitimate broad-scale concern of the philosophy of technology.

Other high-lights of phase I included a paper by Earl MacCormac (Davidson College) describing the background in the history of ideas for the metaphor of the brain as a computer, and arguing that a recognition of the truly metaphoric or hypothetical status of this image is necessary to prevent technique from escaping human control.

Paul Levinson (Fairleigh Dickinson Univ.) gave a much more affirmative assessment of technology as an agent in cognitive evolution than is common among philosophers of technology. In developing some ideas from Marshall McLuhan, he provoked a heated discussion. In contrast, Albert Borgmann (Univ. of Montana) and Langdon Winner (Univ. of

California-Santa Cruz) questioned the relative significance of the computer revolution.

Alois Huning (Dusseldorf Univ.) presented a general anthropological account of technology as a necessary extension of human nature, an argument which exhibited certain affinities with Levinson's. But again Walter Zimmerli (Braunschweig Univ.) pointed out a number of special moral issues raised by information processing which are not adequately dealt with by traditional ethics.

Others present during phase I included, from Germany: Friedrich Rapp (Technical University-Berlin), Sybille Kramer-Friedrich (Marburg Univ.), and Gunter Ropohl (Frankfurt Univ.); from France: Daniel Cerezuelle (Regional Institute for Social Work and Social Research, Bordeaux); from The Netherlands: Egbert Schuurman (Free University); from South Africa: Fanie DeBeer (Univ. of Zululand); from Canada: Alex Michalos (Univ. of Guelph); from Israel: Joseph Agassi (Tel-Aviv Univ.); and from the United States: Don Ihde (SUNY-Stony Brook), Caroline Whitbeck (MIT), and Edmund Byrne (Univ. of Indiana). There was a good mixture of established and younger philosophers (with a few student observers) along with participants from previous philosophy and technology conferences and "new blood."

For phase II, the conference moved from Tarrytown to Manhattan and consisted of two days of more public sessions at the United Engineering Center near the UN Plaza.

Here the morning sessions consisted of submitted papers focusing the first day on engineering ethics and the second on relationships between technology and democracy. Stanley Carpenter (Georgia Tech) and Tom Rogers (Montana Tech) read papers on the first topic, while Kristin Shrader-Frechette (Univ. of California-Santa Barbara) and Michael Black - Richard Worthington (SUNY Binghamton - RPI) dealt with the second.

In the first afternoon Fred Dretscke (Univ. of Wisconsin-Madison) and Hubert Dreyfus (Univ. of California - Berkeley) focused on "Is the Brain a Computer?" In the second Hans Lenk (Univ. of Karlsruhe) and Joseph Weizenbaum (MIT) debated some social implications of computers. Weizenbaum was particularly forceful and provocative in affirming an essential tie between the military and computers.

The public sessions were supported in part by grants from the Matchette Foundation and Goethe House, and were attended by about 60 new participants. They provided a good opportunity for philosophers of technology to begin to reach out to a larger audience.

The conference proceedings are being edited by Alois Huning and Carl Mitcham (Polytechnic Institute of New York), and will be published in both English and German.

At a Society for Philosophy and Technology business meeting on the evening of September 6th it was proposed to hold another conference along the same line in Amsterdam in 1985. To keep posted on these plans one can join SPT and receive its newsletter by sending $5.00 to the SPT Society, Stan Carpenter, Social Sciences, Georgia Tech, Atlanta, GA 30332.

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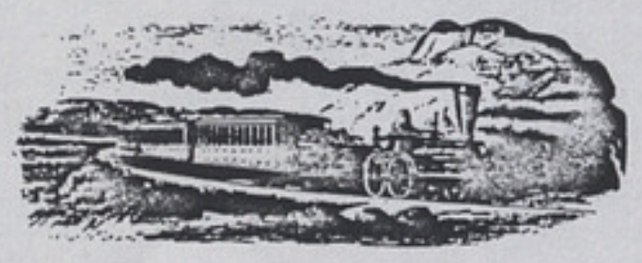

COURSE SYLLABUS

TOPICS IN SCIENCE, TECHNOLOGY, AND SOCIETY

Honors 431
Lamar University
Beaumont, Texas

Gene Martinez, Mechanical Engr.
Jed Ramsey, Biology
Glenn Utter, Government

Science and Technology is a very broad topic for a seminar. Therefore this course has been divided into three sections with each section being conducted by a separate seminar director. The major purpose of the first two sections of the seminar is to introduce the students to particular areas of technology in contemporary society. The last section, although covering some individual topics, will serve as an opportunity to reflect upon the importance of technology and technological advance.

Each seminar director will make his own reading assignments. Papers and examinations will be the basis for grading, depending upon the individual instructor. The final grade will be an average of the grades received from each of the three instructors.

Course Syllabus:

January 11. Organizational Meeting.

SECTION I. ENGINEERING AND COMPUTER SCIENCE.

In addition to one or two projects listed within the topics below, each student will write a paper on a topic chosen in consultation with the instructor.

January 13. Introduction to Technology and Science.
A discussion of definitions; consult dictionaries, encyclopedias, etc., for definitions of science and technology.

January 18. Engineering Education.
Engineering as a profession. Discussion of the Accreditation Board for Engineering and Technology accreditation requirements for liberal education.

Reading: "Liberal Arts Colleges Enter High-Tech World," *Beaumont Enterprise* (16 Jan., 1983).

January 20. A Comparative Analysis of Soviet and American Educational and Technological Systems.
Guest speaker: Yuly Seat, Mathematics

January 25. The Engineering Curriculum.

Reading: Serge Gratch, "The Engineering View," *Mechanical Engineering* (1983), pp. 62-64.
Samuel C. Florman, *Ibid.*, pp. 56-61.

January 27. Computers and Society: An Introduction.
How computers work.
Recent advances.

February 1. Computers in Research, Industry, and Government.
Guest speaker: William Nylin, Professor of Computer Science and Director, Systems, Procedures and Institutional Research.

February 3. Basic Introduction to Programming.
Computer project: Biorhythms.
Handout: "Time-Sharing Terminal Operation". Using these handout instructions, students should be able to access each of four sample computer files:
Example 1: Building/editing files.
Example 2: Executing a program to evaluate a determinant.
Example 3: Program for energy analysis of a steam turbine.
Example 4: Temperature/flow demand of a hot water heater.

February 8. Computer Application: Putting Out a Newspaper.
Word processing and remote typesetting by micro-computer.
Field trip to The East Texas Catholic offices.

February 10. Energy and Society.
Two laws of thermodynamics.

Reading: Doolittle, Jesse C., *Energy: A Crisis, A Dilemma, or Just Another Problem?* Champaign, Il: Matrix Publications, 1977.

February 15. Summation of Section I.
Papers are due.

SECTION II. TECHNOLOGY IN BIOLOGY AND MEDICINE.

There are two brief examinations scheduled. Each student will also, in consultation with the instructor, choose a book to review in oral presentation before the class. A list of suggested readings which parallels the topics in this section is included. Book reviews may be drawn from but are not limited to this list.

February 17. Orthopedic Surgery.
Hip Replacement.
Guest speaker: Dr. Martin Haig, Orthopedic Surgeon.

February 22. Dental Surgery.
The Rames Frame.
Guest speaker: Dr. Jesse English, Oral Surgeon.

February 24. Vascular Surgery.
Advances in Coronary Bypass Surgery.
Guest speaker: Dr. Hanes A. Allums

March 1. Neo-Natal Care.
Field trip to St. Elizabeth Hospital Neo-Natal Clinic.
Guest speaker: Dr. Aiyanadai Bharathi

March 3. Examination.

March 15. Overview and Discussion.

March 17. Agricultural Technology.
Food production for developing countries.
Guest speaker: Robert Marquette, Texas A & M University.

March 25. Pesticides and Their Possible Alternatives.
Guest speaker: Michael Warren, Biology.

March 27. Examination.

March 29. Presentation of Book Reviews.

Section II: Suggested Readings: Medicine.

Banta, H.D.; C.J. Behney; and J.S. Willems. *Towards Rational Technology in Medicine*. New York: Springer, 1981.

Carliste, N. and J. Carliste. *Marvels of Medical Engineering*. New York: Sterling, 1967.

Cook, A.M. and J.G. Webster. *Therapeutic Medical Devices Application and Design*. Englewood Cliffs, N.J.: Prentice-Hall, 1982.

Early, P.J.; M.A. Razzah; and D.B. Sodee. *Textbook of Nuclear Medicine Technology*. St. Louis: Moshy, 1979.

Fudenberg, H.H. and V.L. Melnick. *Biomedical Scientists and Public Policy*. New York: Plenum, 1978.

Ramsey, P. *The Ethics of Fetal Research*. New Haven, Ct.: Yale University Press, 1975.

Wechsler, H.; J. Gurin; and G.F. Cahill, Jr. *The Horizons of Health*. Cambridge, MA: Harvard University Press, 1977.

Section II: Suggested Readings: Biology and Agricultural Technology.

Anderson, W.P. *Weed Science: Principles*. New York: West, 1977.

Crafts, A.S. *Modern Weed Control*. Berkeley: University of California Press, 1975.

Klingman, G.C. and F.M. Ashton. *Weed Science: Principles and Practices*. New York: Wiley & Sons, 1975.

Maxwell, F.G. and P.R. Jennings. *Breeding Plants Resistant to Insects*. New York: Wiley & Sons, 1980.

Metcalf, R.L. and W.H. Luckmann. *Introduction to Insect Pest Management*. New York: Wiley & Sons, 1975.

Perkins, J.H. *Insects, Experts, and the Insecticide Crisis*. New York: Plenum, 1982.

Van den Bosch, R. and P.X. Messenger. *Biological Control*. New York : Intext, 1973.

SECTION III. SCIENCE AND TECHNOLOGY IN A SOCIAL & POLITICAL CONTEXT

In addition to the readings below, each student will write a brief paper based on two articles or one book chosen from the attached list. Each student will also write a second paper on some topic covered this semester that the student finds to be of special interest.

Required Books:

Colin Norman, *The God That Limps: Science and Technology in the Eighties.* New York: Norton, 1981.
Louis René Beres, *Apocalypse: Nuclear Catastrophe in World Politics.* Chicago: Univ. of Chicago Press, 1980.
Walter M. Miller, Jr., *A Canticle for Leibowitz.* Philadelphia: Lippincott, 1969.

March 31. Review of the Course So Far.
Are Science and Technology Really Different?
Carl Hempel, *Philosophy of Natural Science.* Englewood Cliffs, NJ: Prentice-Hall, 1966, Chapter 2.

April 5. Modern Technology in A Historical Context.
Guest speaker: Wesley Norton, History.

April 7. Technology and Contemporary Society.
Norman, Chapters 1 and 2.

April 12. Technology: The Human Factor.
Guest speaker: Ron Lewis of the John Gray Institute will present a video tape and entertain questions regarding industrial productivity.

April 14. Recent Trends in Technological Advance.
Norman, Chapters 3 and 4.

April 19. The Ultimate in Technology: Nuclear Warfare.
Beres, *Apocalypse*, Parts 1 and 2.
Film: The War Game.

April 21. Dealing with Nuclear Weapons.
Beres, Part 3.

April 26. Literary Responses to Technology.
Guest speaker: Sam Gwynn, English
Poetry to be discussed:
"Sonnet: To Science," Poe
"God's Grandeur," G.M. Hopkins
"The Convergence of the Twain," Thomas Hardy
"Fire and Ice," Frost
"Desert Places," Frost
"pity this busy monster, manunkind," e.e. Cummings
"The Fury of Aerial Bombardment," Richard Everhart
"Eighth Air Force," Randall Jerrell

April 28. Discussion Based on Miller, *A Canticle for Leibowitz*.
Guest speaker: Clay Reynolds, English.

May 3. Technology in Perspective: The World System.
Norman, Chapters 5 and 6.

May 5. Overall Summation.
The three seminar directors will be available to receive comments, questions, criticism and suggestions.

Reading List: First paper in Section III.

Articles:

Brooks, Harvey. "Technology, Evolution, and Purpose," in Albert H. Teich, ed., *Technology and Man's Future*, 3rd ed. (New York: St. Martin's Press, 1981), pp. 294-320.

J. Bronowski, "Technology and Culture in Evolution," *American Scholar* (1972): 197-211.

Coates, Joseph F. "Technology Assessment," in Teich, ed., *Technology and Man's Future*, pp. 229-50.

Drucker, Peter F. "New Technology: Predicting Its Impact," in Teich, ed., *Technology and Man's Future*, pp. 251-55.

John T. Edsall, "Scientific Freedom and Responsibility....," *Science* 188 16 May 1975): 687-93.

Jacques Ellul, "The Technological Order," *Technology and Culture* 3 (1962): 394-421.

R. Buckminster Fuller, "Utopia or Oblivion" in Teich, ed. *Technology and Man's Future*, pp. 63-85.

Paul Goodman, "Can Technology be Humane?" in Teich, ed., *Technology and Man's Future*, pp. 335-54.

Theodore J. Gordon and Robert H. Ament, "Forecasts of Some Technological and Scientific Developments and Their Societal Consequences," in Teich, ed., *Technology and Man's Future*, pp. 171-89.

Richard B. Halley and Harold G. Vatter, "Technology and the Future as History: A Critical Review of Futurism," *Technology and Culture* 19 (January 1978): 53-82.

Garrett Hardin, "The Tragedy of the Commons," *Science* 162 (13 December 1968): 1243-48.

Robert L. Heilbroner, "Do Machines Make History," *Technology and Culture* 8 (July 1967), 335-45.

Melvin Kranzberg, "Technology and Human Values," *Virginia Quarterly Review* 40 (Autumn 1964): 579-92.

McDermott, John, "Technology: The Opiate of the Intellectuals," in Teich, ed., *Technology and Man's Future*, pp. 130-63.

Marx, Leo, "Reflections on the Neo-Romantic Critiques of Science," *Daedalus* 107 (Spring 1978): 61-74.

Meadows, Donella H., et al. "Technology and the Limits to Growth," in Teich, ed., *Technology and Man's Future*, pp. 190-215.

Mesthene, Emmanuel G., "The Role of Technology in Society," in Teich, ed., *Technology and Man's Future*, pp. 99-129.

Miller, Perry, "The Responsibility of Mind in a Civilization of Machines," *American Scholar* 31 (Winter-Spring 1961-62).

Mumford, Lewis, "Technics and the Nature of Man," *Technology and Culture* 7 (1966): 303-17.

Nelkin, Dorothy, "Science and Technology Policy and the Democratic Process," in Teich, ed., *Technology and Man's Future*, pp. 270-93.

Norman, Colin, "Soft Technologies, Hard Choices," in Teich, ed., *Technology and Man's Future*, pp. 386-418.

Pursell, Carroll, "Belling the Cat: A Critique of Technology Assessment," *Lex et Scientia* 10 (Oct.-Dec., 1974): 130-45.

Roszak, Theodore, "Science in Extremis: Prospect of an Autopsy," in *Where the Wasteland Ends* (Garden City, NY: Doubleday, 1970), ch. 7.

Shriver, Donald W., Jr., "Man and His Machines: Four Angles of Vision," *Technology and Culture* 13 (October 1972): 531-55.

Smith, Stanley Cyril, "Art, Technology, and Science....," *Technology and Culture* 11 (1970): 493-549.

Van Doren, Charles, "Does a Definite Pattern of Change Exist in Human History as a Whole," and "Technological Progress," in *The Idea of Progress* (New York: Praeger, 1967), ch. 12, pp. 197-217, and ch. 20, pp. 340-54.

Wagar, J. Alan, "Growth Versus the Quality of Life," *Science* 168 (5 June 1970): 1179-84.

Weinberg, Alvin M. "Can Technology Replace Social Engineering?" in Teich, ed., *Technology and Man's Future*, pp. 29-39.

Wenk, Edward, Jr., "Political Limits in Steering Technology,"in Teich, ed., *Technology and Man's Future*, pp. 256-69.

White, Lynn, Jr., "The Historical Roots of our Ecological Crisis," *Science* 155 (10 March 1967): 1203-1207.

White, Lynn T., Jr., "Technology Assessment from the Stance of a Medieval Historian," *American Historical Review* 79 (February 1974): 1-13.

Winner, Langdon, "The Political Philosophy of Alternative Technology," in Teich, ed., *Technology and Man's Future*, pp. 369-85.

Wright, David E., "Promethean Legacy: Ambivalent Relations Between Man and His Tools," *American Examiner* 5 (Srping 1978): 1-25.

Books:

Barrett, William. *The Illusion of Technique*. New York: Anchor/Doubleday, 1978.

Boorstin, Daniel J. *The Republic of Technology*. New York: Harper and Row, 1978.

Calder, Niegel, ed. *Unless Peace Comes: A Scientific Forecast of New Weapons*. New York: Viking Press, 1968.

Commoner, Barry. *Science and Survival*. New York: Viking Press, 1966.

Ellul, Jacques.. *The Technological Society*. New York: Vintage Books, 1964.

Florman, Samuel C. *The Existential Pleasures of Engineering*. New York: St. Martin's Press, 1976.

Granger, John V. *Technology and International Relations*. San Francisco: W.H. Freeman and Company, 1979.

Kuehn, Thomas J., and Alan L. Porter, eds. *Science, Technology, and National Policy*. Ithaca, New York: Cornell University Press, 1981.

Lambright, W. Henry. *Governing Science and Technology*. New York: Oxford University Press, 1976.

Loye, David. *The Knowable Future: A Psychology of Forecasting and Prophecy*. New York: John Wiley and Sons, 1978.

Morehouse, Ward, ed. *Science, Technology and the Social Order.* New Brunswick, New Jersey: Transaction Books, 1979.

Morison, Elting E. *From Know-How to Nowhere: The Development of American Technology.* New York: New American Library, 1974.

Moser, Leo J. *The Technology Trap: Survival in a Man-Made Environment.* Chicago: Nelson-Hall, 1979.

Popovsky, Mark. *Manipulated Science: The Crisis of Science and Scientists in the Soviet Union Today.* Garden City, N.Y.: Doubleday and Co., Inc., 1979.

Ramo, Simon. *America's Technology Slip.* New York: John Wiley and Sons, 1980.

Susskind, Charles. *Understanding Technology.* Baltimore, Maryland: The Johns Hopkins University Press, 1973.

Winner, Langdon. *Autonomous Technology: Technics-out-of-Control as a Theme in Political Thought.* Cambridge, Mass.: The MIT Press, 1977.

Titles for the second paper in Section III of the course included:

"A Modern Response to Technology: The 'Kansas' Album *Point of Know Return.*"

"Technology and Human Emotion."

"The Engineer and Society."

"The Religious Origins of Technology" (based upon Lynn White, Jr's. discussions of the topic).

"Adapting to Technology."

"Fallout and the Food Chain."

"Life Without a Car" (an amusing discussion of one aspect of "autonomous technology").

"The Ethical Dilemma of Technology."

"Responsbility in an Age of Machines."

In addition, there were some papers which discussed the course as a whole or in part.

BOOK REVIEW

Phillip R. Fandozzi, *Nihilism and Technology: A Heideggerian Investigation.* Washington, D.C.: University Press of America, 1983. 158 P. Paperback, $8.75.

Technology is here characterized as a "disclosure." This means that it is a "mode of truth." It "reveals" the world (man and nature) in a particular way as "material for domination." Technology is not a tool, not a means, not a particular form of human consciousness. It is "the way" in which "Being" appears in the modern world. It appears as "a totality of beings" which can be "represented" in "exact" thought. This technological thinking is correlated with a "provocation" of nature (including man) which yields a representation of beings as "secured energy" for use.

This "way" of relating to "Being" is only possible on the basis of a sharp distinction between the representation and the represented. And this involves a sharp dichotomy between subject and object. But when the subject experiences itself as independent of objects, it is set free from its "heritage" and loses its bearings. Such a free-floating subject thinks --inauthentically-- that "everything is possible" to it. This sense of "unlimited possibility" characteristic of technological man, however, has as its correlate the thesis that the object is "nothing." And so one loses the sense of limits, both natural and moral. But this is precisely the essence of "nihilism." Technology is revealed as an essentially nihilistic "way" of relations to "Being." It hides as much as it discloses, and what it hides is "Being."

The author claims to "confirm" this Heideggerian thesis by examinations of selected non-Heideggerian works: Nietzsche's *Will to Power*, Turgenev's *Fathers and Sons*, Dostoyevsky's *The Possessed*, and two "contemporary" philosophical works, Ayer's *Language, Truth, and Logic* (1936), and Sartre's *Being and Nothingness* (1943). These discussions are brief and interesting, but the question of how a selection like this can "confirm" a thesis is not raised. If other selections had been made, would the thesis have been "disconfirmed"?

There is also a brief discussion of Galbraith and Marcuse, the theme of which is that neither has seen as deeply into the essence of technology as has Heidegger.

The entire discussion of technology is carried out at a very abstract level. No particular technologies are presented, no analyses of technical successes or failures are offered, and the book is virtually devoid of examples. Although a bow is made now and then to the positive aspects of technology, the main assessment is negative. So far as a remedy goes, we are offered Heidegger's "essential" or "meditative" thinking, which is non-calculative. Beyond that, "the realization of the threat could be salutary," (p. 129).

The non-Heideggerian sections of the book should be readily intelligible to most readers. For the rest, unless the reader is already familiar with Heidegger's concepts and themes, it will be very hard going indeed. If you are not up for concepts like "negative nothingness," or phrases like "Being turns toward in turning away," this book may not be for you.

There is nothing here like the appreciation of the machine in Pirsig's *Zen and the Art of Motorcycle Maintenace.* It is difficult to resist the speculation that those who do philosophy of technology in this mode are unable to repair a bicycle or to understand the blueprint of an internal combustion engine. Though this may be entirely mistaken, it reads like philosophy by the technologically alienated for the technologically incompetent.

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BOOK REVIEW

Don Ihde, *Existential Technics*. Albany, N.Y.: State University of New York Press, 1983. 190 P. Cloth - $29.50; Paper - $8.95.

This is a mistitled and unintegrated book. Not quite the first half (a bare 77 pages) deals with an existential analysis of the experience of technology. It is a lucid and helpful, although slightly repetitive extension of Ihde's earlier *Technics and Praxis* (Boston: D. Reidel, 1979) --a volume which was favorably reviewed by Paul Durbin in the *HPT Newsletter*, No. 11 (April 1979). However, the last 100 pages focus on the phenomenology of perception and hermeneutics, independent of the issue of technology. Some of the essays in the last two parts of the book (I would single out chapter 5, "Phenomenological Variations and Artistic Discovery," and chapter 9, "Interpreting Hermeneutics") provide an entre into that phenomenological tradition within which Ihde's philosophy of technology makes its home. (The last essay in this collection, on deconstruction theory, fails to measure up to Ihde's usual standards of insight and clarity.)

Technics and Praxis, of which the first part of this books is an extension, began by distinguishing between idealist and materialist attitudes toward technology. The former views technology as applied science, the latter sees science as theoretical technology. Ihde, siding with the latter approach, sketches a phenomenology of human-machine interactions; then reflects on some experiential implications of modern technologies such as computers and electronic music; and concludes by examining the pioneering phenomenological approaches to technology found in the work of Martin Heidegger, Hans Jonas, and European existentialists. Phenomenologically Ihde distinguishes between those machines which extend or embody human experience (the magnifying glass) and those which become the occasion for human interpretative or hermeneutic activity (the electron miscroscope).

Existential Technics builds on this previous work by analyzing how technology becomes involved not just in our interpretation of, or theory construction about, the natural world, but also on the way technology influences our understanding of what it is to be human, that is, our self-image or self-interpretation. The programatic essay is chapter 1, "Technics and Human Self-Conception." Its theme is that "we end up modeling ourselves on the very 'world', *i.e.* we project and interpret ourselves in terms of technology" (p. 22).

However, the best argument to this effect is in chapter 4, "Why Do Humans Think They Are Machines?" Ihde maintains (following Heidegger) that human beings are essentially interpreting and even self-interpreting creatures. This is what distinguishes us from other animals. Our theories about both the world and ourselves are in crucial respects always undetermined by the evidence. The known facts are always compatible with more than one theory. Leaving aside the question of scientific theory, this point is immediately plausible. Are human beings essentially good or bad? The available evidence regarding human behavior can be interpreted to support either position.

Because of this existential characteristic of human nature --that nature in human beings is not fully determined the way it is in rocks, trees, or dogs-- human beings are always trying to define themselves in terms of a relationship to something else whose nature is given. Those we think of as non-technological peoples tend to conceive of themselves in relationship to the natural elements, plants, and/or animals. Witness Plato's allegory of the metals in the *Republic* (circa line 415); the vegetative totems of certain Australian tribes; and the animal spirits taken by Amerindians to be embodied in individuals. "In each case the analogy grasps its likeness by pointing to something which is 'other' than human to interpret what is human" (p. 72). More important than the particular differences of self-conception, which can be accounted for historically, is the underlying structure of this self-reflective activity. "All self-interpretation takes its shape in a certain way with respect to some basic form of existential praxis which is projected upon the world and reflected back in ways which become dominant ways of understanding ourselves and our world" (p. 22).

The fact that technological peoples such as ourselves have largely abandoned the animal, vegetable, and mineral metaphors does not mean that we have ceased to practice the self-conception dialectic. What we have done instead, observes Ihde, is simply replace natural metaphors with ones adapted from technology. Contemporary human beings think of themselves in terms of machines. We say someone has a mind "like a steel trap" or thinks "like a computer." Superman is "faster than a speeding bullet, more powerful than a locomotive." Yet, in each case, we continue to go outside ourselves to search for images upon which to hang our self-understandings --all the while finding this (as the superman allusion hints) vaguely unsatisfactory.

Ihde argues that with the modern metaphor though, something new has been introduced into the dialectic. For the first time the other to which human beings relate themselves is actually created by themselves. "Machines are artifacts which are conceived of, developed and invented, *made* by humans" (p. 72). Indeed, on the one hand, I might suggest that it is a subconscious desire to escape the ononistic and narcissistic implications of such technological self-conceptions that leads some persons to involvements with alchemy, astrology, natural foods, etc. On the other hand, the dialectic pointed up by Ihde is not a wholly new discovery. It is certainly related to that tendency on the part of human beings to become overly involved with their technical achievements --especially monetary wealth, political power, and aesthetic pleasure-- which has been analyzed by religious philosophers from the Old Testament prophets through St. Augustine to Kierkegaard. And the argument by thinkers as diverse as Gautama Buddha, Augustine, and C.G. Jung is that there is something ultimately unsatisfactory with this "participatory mystique" in most of its forms.

What is unsatisfactory with Ihde's own account is that it fails to deal at length with the unsatisfactory dimension of the human tendency to become too closely identified with a technical achievement. He mentions in passing the need for a "loose" or "Zen" relationship to technology (p. 23). Yet, while he rejects the idea that technology is neutral, he also stresses that he does not want to argue the superiority of a premodern over a modern technological life-world, or of one technology over another (see, e.g., pp. 43-44 and 56). While all technologies are non-neutral in that they necessarily transform human experience, neither are they to be categorized as good or bad. They are simply different. Ihde provides a sophisticated defense of Melvin Kranzberg's dictum that "Technology is neither good nor bad --nor is it netural."

One can sympathize with any tendency to shy away from a direct attack on the beliefs of the age. In my own case, I certainly do not relish being clobbered by those who insist that technology has to be either good or neutral. Nevertheless, I cannot escape a contrary suspicion that there are some techniques (such as meditation) which do tend to cultivate just the kind of "looseness" toward technology which Ihde recommends; that therefore those techniques which do not, must, in some sense, be described as "bad"; and that a better reformulation of Kranzberg's Law would be "Technology is always either good or bad --but never neutral." It strikes me, too, that it is Jacques Ellul who has argued this point with greater determination than anyone else, and his book *The New Demons* (1975) is a foreceful indictment of the way modern man identifies himself with his technology after the manner alluded to by Ihde.

In conclusion, the philosophical reflections present in the first part of this book point up otherwise overlooked aspects of our technological experience. Their shortcomings are only that they need to be more fully integrated with previous initiatives, and to be deepened and extended. But given Ihde's commitment to understanding technology, one can expect some of these deficiencies to be remedied in future work.

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M*E*T*A*

MANKIND, ETHICS, TECHNOLOGY, AND THE ARTS

RECENT PUBLICATIONS

BARBOUR, IAN; HARVEY BROOKS; SANFORD LAKOFF; JOHN OPIE. ENERGY AND AMERICAN VALUES. NEW YORK: PRAEGER PUBLISHERS, 1982. 240 P. $12.95.

The National Humanities Center invited these four distinguished scholars who have explored the connections between technology and society to carefully investigate the ramifications of energy supply on our culture built on such democratic ideals as freedom, equality, material progress, and privacy. A historical survey demonstrates how the American energy use has been shaped by abundance and by political choices resulting from the conflict between a Jeffersonian, decentralized, appropriate technology and Hamiltonian ideals of centralization and efficiency. The authors then look at the rapid acceptance and proliferation of electricity, liquid fuels and the automobile, and nuclear power in light of the values which helped promote them, namely domination over nature, the work ethic, freedom of movement, and increased leisure. The problems that have developed over the past twenty years are then isolated with attention to environmental awareness, the aging industrial plant, growing concerns over risk and safety, the simultaneous occurrence of inflation and recession, and government regulation. It is explained how energy supplies and utilization place many of our accepted values in conflict including individual freedom and economic dominance, equity versus efficiency, market forces against rationing of resources. We have become more aware of risk and are willing to explore potential dangers regarding health and safety, environmental degradation, and the threat to world peace generated by shifts of power acquired through control of energy sources.

BORREMAN, VALENTINA. "TECHNIQUE AND WOMEN'S TOIL." CROSS CURRENTS 32 (WINTER 1982-83): 420-29.

Extensive, first-hand experience in the effects of development has enabled the author to see that technical assistance has meant the introduction of a "genderless work ethic and genderless tools" into situations in which subsistence tasks were previously clearly delineated into male and female roles. While this process gives opportunities to a few women, the majority is degraded, and the two sexes are brought into conflict. A mixed labor force ultimately makes women the second sex, doomed to lose in a struggle with men for the same jobs. Research is needed into the sexist effects of appropriate technology tools designed to fit the hands of women or men since they can transform proud women into "handicapped humans of the second sex." Women in each village must investigate proposed innovations to ensure that newly designed tools or a new breed of animal will empower their hands. Economic growth consistently increases the toil of women in "shadow" unpaid work. In addition, today's gender-neutral tools tend to be under men's control, therefore, women lose the power to initiate cultural change which they could once do by altering their own implements.

COLE, LEONARD A. POLITICS AND THE RESTRAINT OF SCIENCE. TOTOWA, NJ: ROWMAN AND ALLANHELD, 1983. XII, 187 P. $17.95.

Cole explores the relationship of science and politics in contemporary American society by utilizing a retrospective analysis of three events frequently invoked by scientists when the suggestion of political regulation or interference with scientific activity is raised. It is his contention that analogies between current incidents in American society and the three historic cases are inappropriate. Galileo's forced renunciation of Copernican astronomy, Lysenko's biological theory being raised to a position of scientific truth, and the Nazi version of racial science are briefly traced. The role of scientists and a range of possible explanations for their general failure to raise objections to the political imposition of scientific truth in each of the historic cases is outlined. Cole draws the conclusion that "scientists, like other citizens, are possessed of an inner requirement to obey authority --even when the authority mandates 'truths' known to be false," (p. 8). He then draws a comparison between the political systems of the societies in each of the three historic cases and the American political system, concluding that the nature of the latter precludes similar occurances of imposition. The remaining chapters of the book focus on contemporary issues in American science and politics and draw upon a survey of scientists regarding their views on the contemporary American political system and its relationship to what constitutes scientific truth and how it may affect scientific activity. Specific considerations include the antievolution activities of the creationists, potentially dangerous research on unknowing humans, and the politics of nuclear power and recombinant DNA research. The scientists surveyed reflect an uneasiness between "a sense of need and apprehension about governmentally imposed restraint of any scientific activity," (p. 9), although younger scientists appear to accept more readily the need for legitimate governmental restraint of potentially hazardous scientific activity than the older generation. Although at times the argument in support of the American political system seems strained and self-serving --one only has to read the revelations of government misdeeds and coverups in the daily newspaper to realize that the system is far from pure --it is certainly more open and responsive than most. The key will be to seek a better understanding of and working relationship between science and politics. Leonard Cole has helped to advance the needed understanding through this useful volume. S.H.C.

CORTADA, JAMES W., COMP. AN ANNOTATED BIBLIOGRAPHY ON THE HISTORY OF DATA PROCESSING. WESTPORT, CT: GREENWOOD PRESS, 1983. XLII, 215 P. BIBLIOG. $35.00.

Approximately 1500 titles arranged in four chronological chapters include both secondary historical treatments and important contemporary primary documents. Most entries are annotated. Additional subheadings on individuals, specific hardware, etc., ease access to the material, and although there is no subject index, an author index is included. Cortada provides a lengthy introduction surveying the state of data processing history, pinpointing opportunities for further study. Like any bibliography in a rapidly expanding field of study, this guide will quickly require updating, but it will remain a crucial starting point for any serious scholar interested in the history of data processing and computers. It should be in the resource section of any serious library. S.H.C.

GARDNER, JAMES B. AND ROLLIE ADAMS, EDS. ORDINARY PEOPLE AND EVERYDAY LIFE: PERSPECTIVES ON THE NEW SOCIAL HISTORY. NASHVILLE, TN: AMER. ASSOC. FOR STATE AND LOCAL HISTORY, 1983. VIII, 215 P. ILLUS: BIBLIOG. $17.50.

A collection of nine essays drawn from a series of seminars on the state of current scholarship in today's social history of ordinary people and everyday life. Following an introductory overview are essays on race and ethnicity, women, urbanization, agriculture, families, and politics. Of particular interest to readers of this publication will be David Brody's "Workers and Work in America: The New Labor History" and Barbara G. and Cary Carson's "Things Unspoken: Learning Social History from Artifacts." Each of the authors surveys the development of their part of social history and offers their perspective as to future directions. Useful footnotes and suggestions for further reading are included in each essay. S.H.C.

SHINN, ROGER LINCOLN. FORCED OPTIONS: SOCIAL DECISIONS FOR THE 21ST CENTURY. SAN FRANCISCO: HARPER AND ROW, 1982. 269 P. $16.95.

The combination of technological power and ethical failure has resulted in such perils as ecological imbalances, resource depletion, and the increasing probability of nuclear war. Shinn aims to demonstrate how social choices have eventually created these problems. He also examines methods by which persons and communities can make more informed decisions regarding technologies, ecology, and social justice. Shinn emphasizes the importance of the relevance of religion, ethical values, economics, and politics on decisions regarding technologies. He considers the varied aspects of and options related to such issues as energy depletion, hunger, population, limited resources, genetics, and war. Finally, he then turns to a review of the religious and social modes of thought which impinge on our decisions, including freedom and accountability in science, attitudes toward risk, and the force of faith and ideology in policy making.

THOMAS, WILLIAM A., ED. SCIENCE AND LAW: AN ESSENTIAL ALLIANCE. BOULDER, CO: WESTVIEW PRESS, 1983. X, 168 P. $16.50.

A series of articles originally commissioned by the National Conference of Lawyers and Scientists, a joint committee of the American Bar Association and the American Association for the Advancement of Science, which appeared in Science and the American Bar Association Journal. Authors and titles include: Howard T. Markey, "Law and Science: A Dialogue on Understanding"; Sheila Jasanoff and Dorothy Nelkin, "Science, Technology and the Limits of Judicial Competence"; Simon Ramo, "Regulation of Technological Activities: A New Approach"; Paoli F. Ricci and Lawrence S. Molton, "Risk and Benefit in Environmental Law"; John I. Thornton, "Uses and Abuses of Forensic Science"; Jordan D. Lewis, "Technology, Enterprise, and American Economic Growth"; James A. Sprowl and James J. Myrick, "Patent Law for Programmed Computers and Programmed Life Forms"; Harold P. Green, "The Limitations of Technology Assessment:; and J. D. Nyhart and Thomas F. Jones, "Education in Science, Law, and Engineering". The intention of this series was to explore the collaboration between law and science that is both increasing and increasingly necessary in our scientific and technological society. While not the last word on the subject, this collection serves a useful function in promoting a broader and hopefully deeper understanding of the interactions between science and law. S.H.C.

Judith Mistichelli
Center for Bioethics Library
Kennedy Institute, Washington, D.C.

Christine Roysdon
Lehigh University Libraries
Bethlehem, PA

OPEN FORUM

CURRENT STS PERIODICAL LITERATURE

is a new section contained in the most recent issue of *The Bulletin of Science, Technology & Society* (Vol. 3, No. 2, 1983; Pergamon Press). The column is prepared by Professor Joseph Haberer of the Dept. of Political Science, Purdue University, West Lafayette, Indiana 47907. Entries are divided into the following categories: History, Nature of Science and Technology; Social Studies, Technology Assessment, Risk Assessment; Science, Philosophy, Religion, Values; International Science and Technology; Resources, Materials, Energy, Food; Health, Biomedical, Bioethics; Public Policy; Environment; and Technology, War and Peace: Disarmament, Weapons, etc. This first listing contains approximately 200 unannotated entries from the last three-quarters of 1982. Addresses for most authors are included should readers desire to write for reprints. The selection of journals searched seems wide-ranging, and this listing should be of use to all scholars in the field. Hopefully Professor Haberer will continue to update this listing. Presumably he would be pleased to receive offprints or references of items to be included in future compilations.

* *

HAGLEY PROGRAM IN THE HISTORY OF INDUSTRIAL AMERICA

The Eleutherian Mills-Hagley Foundation, in cooperation with the University of Delaware, jointly sponsor the Hagley Program in the History of Industrial America, a two-year or four-year program leading either to an M.A. or a Ph.D. degree for students interested in careers as professionals in museums and historical agencies or as college teachers. The Hagley Program's academic focus is on the social history of American industrialization. Within a wide-ranging history program, Hagley Fellows study the context and consequences of economic and technological change wrought by industrialization, including its impact on the lives of American workers.

Financial aid consisting of a stipend of $4,600 per year the first two years and $5,000 the second two years, full tuition, and a small travel fund is available. In addition, an allowance of $1,200 is available to married students with dependent children. These awards are renewable for one year beyond the initial year for students enrolled as M.A. candidates and for three years beyond the initial year for those pursuing the Ph.D. Deadline for application is February 1, 1984 for the academic year 1984-85.

For further information write: Brian Greenberg, Coordinator, The Hagley Program in the History of Industrial America, Eleutherian Mills-Hagley Foundation, P. O. Box 3630, Greenville, Wilmington, DE 19807.

* *

STS RESEARCH FELLOWSHIPS

The MIT Program in Science, Technology, and Soceity invites applications for several one-year research fellowships on the relationships of science, technology, and society, with a preference given this year to the history of science. Ph.D. or equivalent desirable. Partial or full stipend. Application deadline January 15, 1984. For more information write: Shawn Finnegan, E51-128, MIT, Cambridge, MA 02139.

THE HUMANITIES, SCIENCE, AND TECHNOLOGY PROGRAM

of the National Endowment for the Humanities

recently announced a series of new grants that will support research on a broad range of topics designed to improve the ability of the humanities to interpret, analyze and assess both the practices and the impact of science and technology. Appropriate foci for these new research projects might include, but need not be limited to: the form and content of scientific and technological knowledge, the interaction among science, technology and other elements of culture, and the conceptual and methodological foundations of humanities studies of science and technology. The program invites proposals which approach any of these foci from the perspectives of history, language and literature, philsophy, art history and criticism, comparative religion, jurisprudence, and those areas of the social sciences which emphasize historical and philosophical methods. Formal guidelines for the new award will be issued early in fall 1983. The first deadline will be March 1, 1984. However, applicants are urged to submit preproposals by January 1, 1984. In the meanwhile, the NEH will be happy to answer questions about any of its grant-making activities.

Write or call David E. Wright, Program Officer, or Eric T. Juengst, Program Specialist, Humanities, Science and Technology Program, Division of Research Programs, National Endowment for the Humanities, 1100 Pennsylvania Avenue, N.W., Washington, D. C. 20506. (Phone [202] 786-0207).

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AMERICAN CERAMIC SOCIETY FORUM

History and Prehistory of Ceramic Art, Science and Technology

to be held at the Society's Annual Meeting, April 30 and May 1, 1984, in Pittsburgh, PA. This forum will be held in three sessions: (a) Pottery and Porcelain; (b) Ethnological and Archaeological Studies; (c) History of Ceramic Science and Technology. Both ceramic devlopments per se and the use of ceramic artifacts as historical evidence will be accepted. Papers presented at the forum will be published as a volume in *Advances in Ceramics*. Submissions should be written to be understandable to a wide audience and will be refereed to insure a high standard. Papers based solely on stylistic features or analysis techniques or other descriptions of artifacts independent of their historical or archaeological context should not be submitted. For inclusion in this publication, manuscripts must be submitted at the forum. There will be an open meeting of the advisory committee to discuss plans for future symposia and publications.

Proposed submissions may be sent to: Prof. W. D. Kingery, Forum II Program Chairman, American Ceramic Society, 65 Ceramic Drive, Columbus, OH 43214, or Room 13-4090, Massachusetts Institute of Technology, Cambridge, MA 02139.

EBCN/cpf

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