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ROBERT K. MERTON AWARD, 1993

Peter Whalley, Chair, Awards Committee

The 1993 Robert K. Merton award for distinguished work published within the past five years is shared by Elaine Draper for Risky Business: Genetic Testing and Exclusionary Practices in the Hazardous Workplace, and Donald Mackenzie for Inventing Accuracy: A Historical Sociology of Nuclear Missile Guidance.

Each of these two books outstandingly demonstrates how recent theoretical achievements in the sociology of science and technology can be brought to bear on technical practices which are literally life and death issues for millions of people. They do so by skillfully unpacking the "black boxes" of technologies and expertise. In an age often characterized by technological pessimism, they not only remind us of roads not taken but of possibilities still available.

The use of genetic screening to exclude from the workplace particular groups of "susceptible" workers is a classic example of the use of new technical practices as occasions to restructure our world. Elaine Draper's Risky Business shows how the attempt to shift the focus from the "hazardous workplace"– a place where employers have responsibility for the health and safety of their employees; to "susceptible workers"--genetically unsuited for certain kinds of employment; is not any inevitable consequence of a scientific breakthrough in genetics, but a thoroughly social construction in a world where the resources for the struggle are largely in the hands of employers. As Draper argues, there were, and continue to be, real alternatives to exclusionary genetic testing as a way of improving workplace health and safety; alternatives that have largely been ignored by interests for whom they are more costly or less convenient, and who instead have latched onto genetic testing as way of shifting responsibility. Draper's work stands out for its powerful argument, its meticulous documentation and its exemplary research. By allowing all parties to speak she skillfully recreates the rhetorical frames of the debate and in so doing makes a powerful and persuasive argument for the social embeddedness of the scientific, technical, legal and political practices of workplace health and safety. Draper's work encourages us to look beyond scientists and laboratories to other places where technoscience is structuring our lives, and to subject other groups of experts to the careful analysis already applied to scientific practice.

If Draper's concern is with worker health, it might be argued that Donald Mackenzie's Inventing Accuracy is concerned with the health of humanity as a whole. He takes what is normally presented as the inevitable outcome of technical progress--the increased accuracy of nuclear missiles--and shows how this accuracy can only be understood as,

> "the product of a complex process of conflict and collaboration between a range of social actors including ambitious, energetic technologists, laboratories and corporations, and political and military leaders and the organizations they head. The invention of accuracy has fueled, and has itself been fueled by, the cold war. It has been a shaping force, but has itself been shaped." (Mackenzie, 3)

Mackenzie's work is both an excellent exemplar of recent theoretical developments in the sociology of technology, and a tour de force of historical and sociological research. Not only does Mackenzie unpack the inevitability of

improved missile accuracy but by showing the mechanisms by which this sense of inevitability was constructed, how resources were mobilized in favor of this technological trajectory rather than others, and how the seeming separation of technical and political factors needs to be seen as itself a social achievement, he re-affirms, with Draper, a sense that things "could be otherwise".

By taking on issues such as nuclear missiles and occupational safety Mackenzie and Draper remind us that in an age of organized expertise and entrenched technologies "opening up the black box", if done with the dedicated attention to evidence and persuasive argumentation that characterize both these books, can be a major contribution to opening up public debate. In these works, the sociology of science and technology is beginning to fulfill its democratic promise.

CALL FOR PAPERS:

Papers or abstracts are sought for two sessions at the Midwest Sociological Assn. meeting in St. Louis March 10-13, 1993. Session titles are: (1) Technology and Social Structure: Defining Their Relationship; and (2) Alternatives to Verbal Interaction: From Smoke Signals to E-mail. Send submissions to Anne Eisenberg, Dept. of Sociology, University of Iowa, W149 Seashore Hall, Iowa City, Iowa, or by e-mail to EISENBRG@VAXA.WEEG.UIOWA.EDU.

A session on "World-science and technology systems" will be held at ASA 1994, jointly sponsored by SKAT and PEWS (Political Economy of World Systems) sections. Papers should be submitted in accordance with ASA guidelines and deadline to either of the co-organizers Thomas Schott (Dept. of Sociology, University of Pittsburgh, Pittsburgh, PA 15260) or Trevor Pinch, (Dept. of Science and Technology Studies, Cornell University, Ithaca NY 14853-2501).

RECENT PUBLICATIONS BY SKAT MEMBERS:

papers by Branden B. Johnson: "Advancing Understanding of Knowledge's Role in Lay Risk Perception," RISK: ISSUES IN HEALTH AND SAFETY, summer 1993, 4:3, 189-212; "Coping With Paradoxes of Risk Communication: Observations and Suggestions," RISK ANALYSIS, June 1993, 13:3, 241-243; "'The Mental Model' Meets 'The Planning Process:' Wrestling With Risk Communication Research and Practice," RISK ANALYSIS, Feb. 1993, 13:1, 5-8; "Testing the Role of Technical Information in Public Risk Perception," RISK: ISSUES IN HEALTH AND SAFETY, fall 1992, 3:4, 341-364 (with Peter M. Sandman and Paul Miller).

papers by Joyce Tang: "Whites, Asians, and Blacks in Science and Engineering: A Reconsideration of Their Economic Prospects," pp. 249-291 in RESEARCH IN SOCIAL STRATIFICATION AND MOBILITY vol. 12, ed. by Robert Althauser and Michael Wallace, JAI, 1993; "The Career Attainment of Caucasian and Asian Engineers," SOCIOLOGICAL QUARTERLY, 1993, 34 (3), 467-496; and "Caucasians and Asians in Engineering: A Study in Occupational Mobility and Departure," pp. 217-256 in

RESEARCH IN THE SOCIOLOGY OF ORGANIZATIONS, vol. 11, ed. by Samuel Bacharach, JAI, 1993.

Debbie Indyk and David Rier, "Grassroots AIDS Knowledge: Implications for Boundaries of Science and Collective Action," KNOWLEDGE: CREATION, DIFFUSION, UTILIZATION, 15(1), 3-43.

NEW DISSERTATION: Daniel Breslau, University of Chicago, "Rationality and Measurement in U.S. Labor Market Policy, 1960-1990." Research on the role of social science in the welfare state has neglected the social context of social scientists' work. Some studies have either bracketed off the production of social science, assuming that it becomes relevant only after it enters the field of politics. Others have collapsed the production of social science onto the field of political struggle over state policy, so that social scientists' contributions are treated as direct expressions of particular class interests or political programs. The inadequacies of both these alternatives can be avoided by situating the work of social scientists within the scientific field itself. Drawing on recent work in the sociology of science, an approach is outlined that analyzes social scientists' practices in terms of their interests in a competition within their field, while taking into account the way that field is shaped by its relationship to sponsors within the state.

FROM THE EDITOR: Keep your contributions coming! Send your essays, notices about new publications, summaries of dissertations in progress, calls for papers, etc., to Maurice Richter, SKAT editor, Sociology Department, University at Albany, 1400 Washington Ave., Albany, New York 12222; fax 518-442-4936; home phone 518-869-6720; e-mail MR274@rachel.albany.edu.

SCIENCE FOR THE INFORMATION AGE

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(Appeared in Michigan State University Alumni Magazine, Fall 1993. Reprinted with permission of Robert Bao, Editor of the MSU Alumni Magazine.)

Skills in mathematics and science are crucial for Americans today. Individuals need them to survive in the labor force, and the labor force as a whole needs them for the economy to thrive in the global marketplace. A century ago, we stopped being a nation of farmers when we figured out how to grow plenty of food with very few people. In

this century, we have ceased being a nation of manufacturers by automating (and exporting) the processes that produce the things we live with. Our collective economic future now lies in providing high-skill services to the world market.

Yet mathematics and science skills are precisely the ones American young people are most likely to avoid acquiring in school. At the center of the standoff between American youth and their educational institutions is an aversion to the kinds of knowledge that are most likely to empower both students and the nation.

Why is this so? While we often think of science in instrumental terms, as an identifier and solver of problems, we seldom pause to consider its cultural significance. What does science mean to American young people? Why do so many of them avoid it?

You need only watch a Saturday morning of television to be reminded of the themes that surround science in popular culture. The dominant one is fear. In films since the 1920s, scientists have been depicted largely negatively. (Steven Goldman, "Images of Technology in Popular Film: Discussion and Filmography," SCIENCE, TECHNOLOGY AND HUMAN VALUES Vol. 14, Number 3, Summer 1989, pages 275-301.) In many films, scientists and engineers have been depicted as servants of corporate or military institutions. In THE CHINA SYNDROME, for example, the hero nuclear power engineer carries out the wishes of a power utility whose allies are the police. The central image of DR. STRANGELOVE is the amoral scientific genius, ready to do whatever research is fundable. Technology often appears in the films as an antihuman force, as in THE EMERALD FOREST, in which an American engineer helps with a socially-destructive dam project in the Amazon. These fictional themes contrast with the optimistic official rhetoric that often surrounds the pursuit of science and technology, and expresses widespread anxiety over their ultimate social impact. (The preceding discussion is drawn from Goldman, op. cit.).

It is not incidental that the mad scientists of early twentieth century film were invariably male, their victims often female. The stereotypical masculinity of fictional scientists does justice to neither the real men nor the real women of science, but rather reinforces symbolically the theme of lack of human feeling. Separation from family, for example, is one of the signs of the scientific obsession. While many mad scientists have wives, they never go home to them but rather stay in the laboratory all night. Popular portrayals of women scientists have made them detail-oriented and uncompetitive--that is, not true scientists. For example, the Rosalind Franklin character in the video version of James Watson's book, THE DOUBLE HELIX, after having her data stolen by two over-ambitious young men, at

the end of the film gazes up at the model of DNA they have built and which will win them the Nobel Prize. Without any sign of pain or frustration, this fictional Franklin comments serenely on the molecule's beauty. (Luckily, a more realistic, human Franklin has been described by her friend Anne Sayre [ROSALIND FRANKLIN AND DNA, New York: Norton, 1978]).

The association of science and its products with fear, centralized power, and lack of concern for people is only reinforced for young people by schools. Rather than being treated as basic knowledge that everyone can grasp (like reading and writing), mathematics and science are treated in schools as inborn skills. One is either good or bad at them by nature--much as one is either "an athlete" or "not an athlete." Students are tracked more often and more finely in mathematics than in any other part of the curriculum. The message to those tracked down is: Leave this stuff to the smart people. The message to those tracked up is: You have a natural right to autonomy in mathematics-intensive matters, because others are incompetent.

The result is polarization--and trouble for the nation, when we suddenly realize that what we need is not an arrogant, isolated technical elite, but rather a citizenry with a *range* of technical skills, a high average skills level, and a sense of ***self-confidence*** about technology. Our schools have been producing exactly the opposite.

The revolution that will overturn this state of affairs is fortunately underway, but educational revolutions move slowly. In grade schools and high schools, teachers are re-humanizing science courses. They are putting science back into context, teaching skills while showing how they can be used to solve human problems. STS--science, technology, and society--is being infused into science curricula across the country. Teachers are also aware of their recruitment patterns, and are trying hard to have their science achievers "look like America." A new breed of students is beginning to move through the pipeline.

Before they reach the laboratories and design shops, however, they have to get through college. Here the revolution is moving more slowly. The technical core of education for scientists and engineers remains largely unscathed by the introduction of social context or human values. As a professor in a school of humanities and social sciences at a technical university, I know that my colleagues across campus would rather pass off the problem of the human face of engineering to me, while continuing to pass on the obsession of the technical to "their" students. Ironically, alumni of our institution report that what they needed most in their jobs as technical managers was what we gave them very little of: communication skills,

understanding of people, and insight into the tradeoffs of technological decision making. But the faculty who taught them most frequently during their years in engineering school -- those in the science and engineering departments--live in a technical ghetto, insulated from the forces that produce those needs. Thus the miseducation goes on.

If we want to have an economy with high employment, in high-skill, high-wage jobs--the new American dream--then we must stop polarizing ourselves along the dimension of technical knowledge. We might find an appropriate model in the all-women's Utopia described by Charlotte Perkins Gilman in her 1915 novel HERLAND (republished by Signet Books in 1992). The women of Herland (who have been on their own for 2000 years to the time they are described in the novel) honor above all else two types of thinkers: critics and inventors. They have worked out chemistry, botany, and physics, and organized a scientifically sophisticated life that is physically beautiful and ecologically balanced. They use machines only when they serve the larger purpose to which their society is devoted: creating a better world for their daughters. Gilman writes:

> Some knew far more than others about one thing--they were specialized, of course; but all of them knew more about everything--that is, about everything the country was acquainted with--than is the case with us. (p. 65)

What steps do we take from here in the general direction indicated by HERLAND as well as by the present political consensus? In schools, we should treat science and mathematics as basic knowledge that everyone can grasp, and re-humanize the context in which we teach them. In college, we should merge science, engineering, social science, and humanities curricula to a much greater degree than we currently do, thus putting science back into the stream of world civilization for our students. Finally, we should at every opportunity build and reinforce the skills of the American public, to empower them in relation to the world of increasingly knowledge-based political and economic institutions in which they--we--must all survive.

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FOR STUDENTS

Monica J. Casper, UCSF

This column marks the start of my tenure as a member of the SKAT Council, a position which I'm delighted to hold. As a student representative, a major priority is to ensure that SKAT, and ASA more broadly, remain responsive to

students' diverse needs and interests. In order to do that, however, I need to know what issues are important to other students. Consider this an open invitation to any and all who would like to share their concerns, ideas, complaints, suggestions, and so on.

I am also interested in using this position to enhance networking opportunities between students from different organizations. For example, Stefan Timmermans, the student representative of the Society for Social Studies of Science (4S) and I have begun discussing strategies for assessing the multiple needs of "science studies" doctoral students. We're also trying to figure out ways to increase interaction between students in these professional groups. Such linkages may prove useful not only for encouraging student-to-student networking, but also for building relationships between students and faculty.

Yet another area of special (indeed chronic) concern to students is funding. Are current funding opportunities sufficient to meet student needs? How can funding organizations make student programs more accessible and relevant? I believe we can and should use SKAT as a forum for voicing our opinions about available resources. For example, Ron Overmann recently informed me that NSF is considering reinstituting its postdoctoral fellowship in science studies. If we collectively think this is a good idea (and it certainly sounds like one) then perhaps we should let NSF know. I'd be interested in hearing your opinions about these issues.

I also want to encourage you to consider submitting papers for the Mullins Award, annually given to an outstanding student paper in the field. Don't be shy, get your work out there now for the rest of us to read and maybe win an award doing it.

Last, I want to extend an invitation to anyone interested in serving on a student sub-committee within SKAT. If your cup of tea is writing newsletter columns, organizing receptions, helping put together a revised student membership directory, and other exciting tasks, then please get in touch with me., Even if you're not at all interested in joining a committee, you might consider writing something for this column. It would be nice to hear many students' voices in these pages.

My e-mail address is mcasper@itsa.ucsf.edu. I can also be reached at the Department of Social and Behavioral Sciences, Box 0612, UCSF, San Francisco, CA 94143. I'll look forward to hearing from you.

INTERNATIONAL ALLIANCES AMONG FIRMS: A STUDY PROVIDING RESEARCH EXPERIENCE FOR UNDERGRADUATES

Thomas Schott, Daniel L. Saaty, and Keith E. Davis
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"We are living through a transformation that will rearrange the politics and economics of the coming century. ... All that will remain rooted within national borders are the people who comprise a nation. Each nation's primary assets will be its citizens' skills and insights."

So begins the book **The Work of Nations: Preparing Ourselves for 21st-Century Capitalism** by Robert B. Reich at Harvard University. He has become Secretary of Labor in the Clinton administration so his vision may become somewhat of a self-fulfilling prophecy.

Such national assets as citizens' skills and insights are in this country promoted by the National Science Foundation. As a program announcement declares, *"One of NSF's principal goals is to assure an adequate supply of high quality mathematicians, scientists and engineers for the future. This requires continuing efforts to attract talented students into research careers in these fields, and to help ensure that they receive the best education possible. The undergraduate years are critical in the educational sequence, as career-choice points and as the first real opportunities for in-depth study. There is widespread agreement that active research experience is one of the most effective techniques for training undergraduates for careers in mathematics, science and engineering, and that too few such experiences are now available. NSF has established the Research Experiences for Undergraduates Program to help meet this need."* (Program announcement for REU).

Accordingly, we applied to NSF (Sociology Program to provide Research Experience for Undergraduates) for funds to provide research experience for undergraduates in sociology and received a grant supplementing an award to investigate *International technological inventive activity and the U.S. position* (SES-92-10473 to Schott from the Sociology Program and the Program for Research on Science and Technology). Schott had taught an upper-level course on *Organizations: Theory and Evidence* in which the students learned to use computer software for analyzing systems of transacting organizations. In this course there were two students who were especially interested in preparing themselves for graduate studies, Keith E. Davis and Daniel L. Saaty, and they became Research Trainees with support from NSF. Last spring each enrolled in an 'Independent Study' so as to also get educational credit for the research experience and we embarked on an analysis of the transformation diagnosed by Reich.

In the coming century, Reich envisioned, *"There will be no national products or technologies, no national corporations, no national industries."* Is a transformation occurring by which production and technology are pursued by corporations that are losing their anchorage in nations? To examine this apparent transformation, albeit in a quite modest way, we are asking whether corporations pursue strategic partnering with one another irrespective of their nationality or whether their nationality continues to be salient?

These questions may be answered by analyzing data on the formation of agreements between companies for transfering or developing technology. Such strategic partnering between firms are reported in newspapers and magazines around the world and data on partnering have been compiled and published by Hagedoorn in Research Policy (1991). The relationship from each firm to each firm was shown in the journal as a line between them. The students coded this information into data files in a computer; for each pair of firms, they entered the number of alliances between them. Using these data as input into a computer program for analyzing social networks we have begun examining the networks of alliances in the microelectronics industry. We use the data on the network of alliances in 1980-84 among the 45 firms with most alliances, and, likewise, on the network of alliances 1985-89 among the 45 firms with most partnerships in that period.

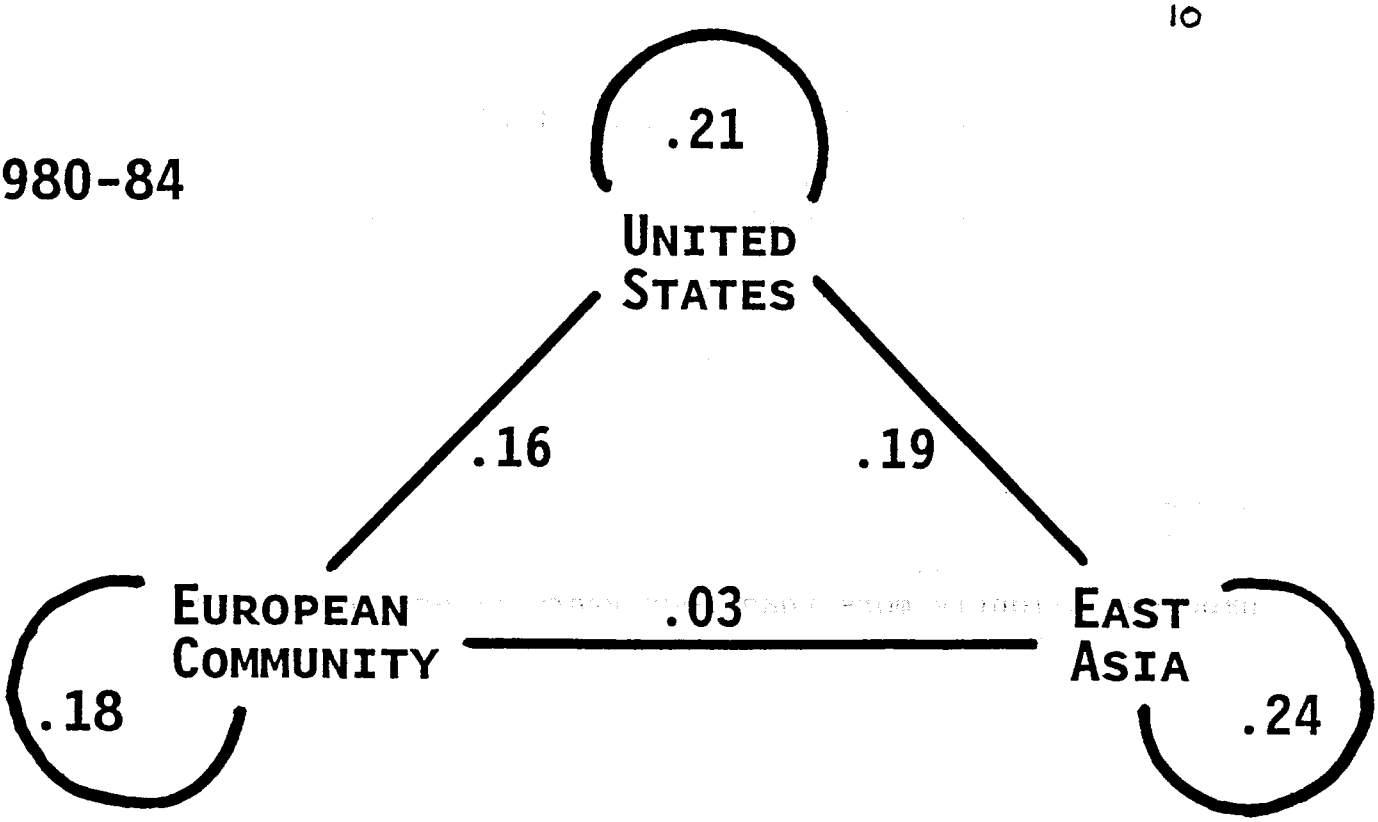
In each period, it turned out, almost half of these firms were headquartered in the United States (e.g. IBM and Intel), about one quarter were in the European Community (e.g. the Italian Olivetti, the Dutch Philips, the German Siemens, the French Thomson, and Plessey in the United Kingdom), and the remaining about one quarter were East Asian (e.g. the Japanese Toshiba and Samsung in South Korea). Partnering was thus significant only in this triad of regions. For each period, the average number of alliances among the firms within each region and the average number of alliances between the firms in each pair of regions are listed in the graph.

In each period, the number of alliances among the firms in East Asia was .24, on average, per pair. That is, there was an alliance for every fourth pair of East Asian firms. In the first period, alliances were less dense among the American firms and among the firms in the European Community. But in the second period alliances became much more dense among the American firms and, especially, among the firms in the European Community (indicating a process of Europeanization). Alliances across regional boundaries have been much more sparse, especially between European and Asian firms, in particular in the first period. Alliances across regional boundaries have become more frequent but have not increased as fast as alliances within regions. This indicates that the globalization has not been occurring as fast as the regionalization of cooperation in big business. In short, nationality has continued to matter.

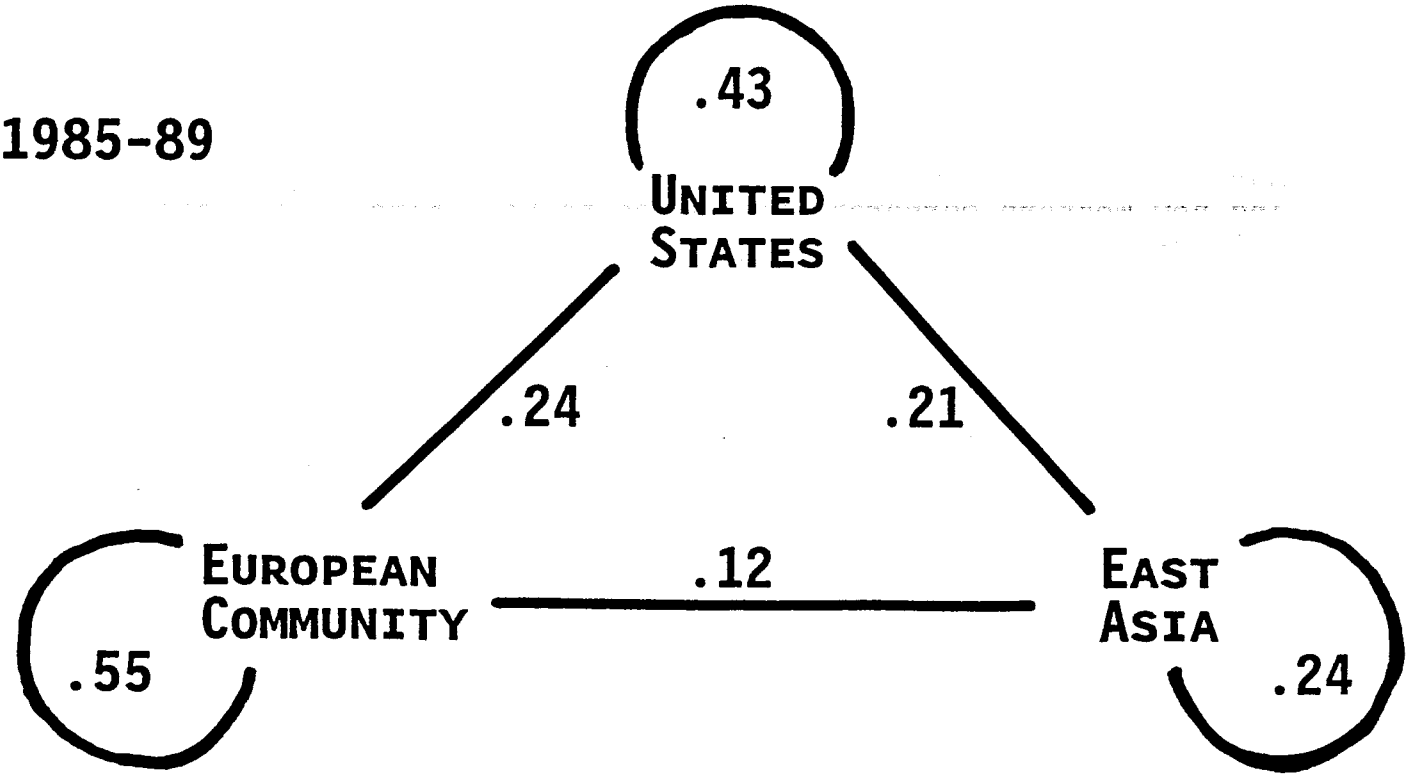
The first results were presented by Danny at the Research Fair held by the University Honors College last spring and by Keith and Danny at the 13th annual Mid-Atlantic Undergraduate Social Research Conference held at Gettysburg College. They will expectedly present further results at the annual meeting of the Pennsylvania Sociological Society this fall.

The experience is intended to enhance the Research Trainees' motivation and preparation to enter a graduate program and thereby become researchers. Of the two Research Trainees last spring, Keith has continued as a Research Trainee, supported by a Brackenridge Summer Fellowship from the University Honors College and by the NSF grant to Schott. The other Research Trainee, Danny, has graduated and this summer he has been supported by a curriculum development grant to Professor Schott to participate in developing a module on international technological cooperation for a new course. Danny has been admitted to graduate school this fall, the doctoral program in sociology at Pitt.

1980-84



1985-89



A BRIEF CASE HISTORY OF A GOVERNMENTAL BLUNDER

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

On November 23, 1981, reading the NEW YORK TIMES, I noticed an op-ed piece warning that we were about to make a bad mistake in our space program, by relying exclusively on manned shuttles for satellite launchings. The author, David W. Lippy, then a graduate student at the Fletcher School of Law and Diplomacy, pointed out that, with unmanned launch vehicles being phased out, an accident "followed by a protracted standdown period would temporarily eliminate US access to space." I saved his article, to read to my students after what he predicted had come to pass, which happened slightly more than four years later, January 28, 1986, when the Challenger shuttle exploded in flight, and the remaining shuttles were subsequently grounded.

A few months after the Challenger disaster, in summer 1986, I went to teach at Nankai University in Tianjin, China. The shuttles were still grounded then, and problems had developed also in the European space program. The Soviet Union was continuing with its own vigorous space program, but that program did not include commercial satellite launchings for Western business corporations, which meant that China had temporarily become THE place for a corporation to go, to try to get its satellites launched.

I could hardly believe that this was happening. The China that I saw around me during that summer, and also on a brief previous visit in 1979, was a country where one could often see holes for the foundations of new buildings being dug out by hundreds of men with pickaxes and shovels, where bricks were often transported to construction sites by wheelbarrow, where food came into large cities from the surrounding countryside in carts pulled by human muscles. And now Western corporations seemed to be lining up to have this same China launch their satellites for them.

China's prominence in this respect turned out to be ephemeral. But how could it have happened at all? How could the United States allow itself to be bypassed, even very briefly, by a country as technologically backward as China, with respect to an aspect of technology that is so conspicuous and so clearly vital? How could a warning as obviously right as Lippy's, and published where one would suppose it would receive the greatest possible attention (on the op-ed page of the NEW YORK TIMES) -- how could such a warning be ignored?

Even AFTER the Challenger disaster, American public opinion never came to focus sharply on questions of that sort. Post-disaster attention was focused, first, on the

individual astronauts who had died aboard the Challenger. Later, attention focused on questions of responsibility FOR THE ACCIDENT, e.g., responsibility for attempting to send a vehicle with people aboard into orbit under conditions that came to be recognized in retrospect as not having been sufficiently safe. But what about responsibility for developing a space program in which a critical element of redundancy was absent, in which the nearly complete abandonment of unmanned-launch capacity led the United States to rely so heavily on manned spacecraft that the grounding of such spacecraft after an accident crippled America's access to space for many months?

American public opinion never came to focus on that issue. The American people have remained generally unaware of the blunder that their government made in ignoring a graduate student's timely, obviously valid, and well publicized warning.

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LET US THANK our retiring officers for jobs well done: the retiring Chair, Susan Cozzens, and retiring Council members Rosa Haritos, Jim Peterson, and Peter Whalley.

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