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EXPLORATIONS

A JOURNAL OF RESEARCH AND PUBLIC SERVICE
AT THE UNIVERSITY OF MAINE

Cover

Reproduced on the cover is a 38" x 49" chalk on paper, Untitled #13, Series 2, by Ronald Ghiz, Associate Professor of Art at the University of Maine, where he teaches drawing, design, painting, Italian and Northern Renaissance Art History, and Contemporary (19th and 20th Century European and American) Art History. His work has been shown extensively including a one-artist show at the University of Michigan's Gallery 18, which followed a group show at the same gallery; the invitational 1983 Maine Biennial at Colby College; the 3rd Annual Paper in Particular National Print and Drawing Show at Columbia College; the 25th North Dakota Print and Drawing Annual at the University of North Dakota; a one-artist show at the Maine State House by invitation of the Maine State Commission on the Arts & Humanities; the LaGrange National V. Juried Drawing Show at LaGrange, GA; and the Artist as Teacher Group Show at the Maine Coast Gallery, Rockport, ME.

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EXPLORATIONS

A JOURNAL OF RESEARCH AND PUBLIC SERVICE AT THE UNIVERSITY OF MAINE

Volume VI

1991

Number 2

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Editorial Overview:

in this issue

Recently we overheard a colleague respond to news of an evolving social horror by saying, *Do you mean I have to worry about that?* An annoyed peer responded caustically that of course she must, if she were even to pretend to a social conscience.

Our colleague's distress at *having to worry about a social injustice* had nothing to do with a lack of social conscience: her dilemma was simply that there were so many events and conditions worthy of concern.

While the contents of this magazine issue reflect a multitude of disturbing stimuli in our contemporary environment, we trust that in most cases our authors have included some possible positive action, optimistic suggestions, or at least intellectual routes which can help us come to terms with what *we are having to worry about*.

Professor Bill Whitaker and his Honors class took a long hard look at a wrenching problem: they touched hunger in Maine. They explored its faces and its manifestations. Bill's students are a lesson to many of us as they turned from shocked awareness to obtaining data, analyzing the situation, and in some cases, moving to careers to help ameliorate it.

Youngsters, too, looked at a stressful problem in our environment: the environment itself. Still wearing the protective coating of childhood's strict disjunction, they responded to a public outreach program on pollution by demanding to know why we adults can't *Stop Pollution Now*. Nick Houtman patiently led them through classroom games to demonstrate how they could make a difference by taking a long-term view and working to lessen cumulative problems.

Professor Munson's scholarly examination of the reasons

for the Iranian Revolution brings back recent memories of a stunned nation keeping vigil for U.S. Embassy hostages. Its geographical focus pulls our minds reluctantly to other complex and no less ugly immediate relationships in the Mideast.

Through the courtesy of Professor Michael Palmer, we have also included in this issue a joyous celebration of intellect—for us a homecoming to the demanding and delicious study of Thucydides' observations of the Peloponnesian War. For Thucydides a world war, the conflict endured for most of his adult years. The analyses, questions, and penetrating quickness of his mind are unparalleled in political thought. Soberingly enough, they are specifically germane to our times.

The Professors Garsombke have presented us with a practical and economically relevant analysis of small business in Maine. As we watch our state's economy encounter difficulty, their words offer windows on the relationships between the use of technologies and productivity.

And finally, we have introduced another writer, Jamie Watter, who is a graduate student in the sciences, specifically zoology. She is deeply interested in communicating the mysteries and the wonder of knowledge. We think she has promise, and we hope to see more of her work.



Carole J. Bombard
Editor



Fall in Maine.

Human conduct matters: it has an acute, as well as cumulative, impact on our home planet. The vehicles used to disseminate this message from the University of Maine vary from active recognition of Earth Day to instigation and current participation in Coastal Cleanup weeks, from prototype recycling projects to energy regeneration with salad bar scraps and animal waste. Each project sings the lessons of environmental awareness: each assigns accountability for actions. And the most receptive audience is the future: the youngsters who will inherit the promise of environmental cinders or environmental prosperity.

Save the Planet ... please

by Nick Houtman

I knew I had gotten my message across when Jeremy, who is nine, pointed to the oily water in the gallon jar and asked, "Now what are you going to do with that, Mr. Houtman?" I didn't know exactly, but Jeremy had gone to the heart of the issue.

I had been talking with Jeremy and his fourth grade classmates about water quality. The message was simple: water contains many dissolved natural substances, but it also can be polluted by people. To demonstrate, I had the youngsters put on various occupational hats from street sweeper to farmer to sewer plant operator (their favorite). We filled a jar with clean water from the tap. Each student took a turn talking about what he or she might inadvertently put into a stream, a lake or the groundwater during the course of a work day.

Then came the best part. The students got to toss a little dirt or oil into the jar. In fact, we had a whole range of materials to add: dishwasher detergent, soy sauce, ammonia, carpenter's chalk, soda and sand. Each stood for real pollutants (such as pesticides or industrial solvents) or nutrients. Each new addition brought cheers or cries of disgust from the students, some of whom took pleasure in dumping more than their share and watching it swirl through the jar. The result was predictable. The recently-clean tap water had become a dark liquid which resembled black mayonnaise from the bottom of Boston Harbor.

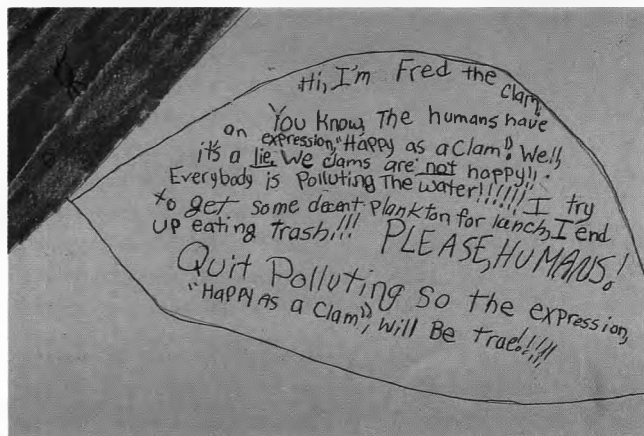
Of course, water pollution is not new, and students need to know more than that it happens. They need to know how it can be corrected and who is going to pay the bill. So we played another game in which the students get \$100 to spend for two purposes: preventing water pollution and making some capital improvement to their businesses. To their credit, the students realized that they could often accomplish both ends with the same monetary investment.

Nick Houtman is Natural Resources Communicator in the Environmental Studies Center at the University of Maine. He earned his Master's degree in Water Resources Management at the University of Wisconsin-Madison, and his work interests focus on waste management, sludge utilization, and groundwater protection.



EARTH DAY, 1990, depicted by Brandy Cameron, grade 5, Fairmount School, Bangor.

Jeremy and his classmates are eager to SAVE THE PLANET, and they wonder why we can't just change our habits — right now. Their question is a legitimate one. Jeremy and his classmates learned that putting in place the



FRED THE CLAM, the creation of Gretchen Perry, has a good deal to say to humans on Earth Day, 1990. Gretchen is in fifth grade at Harpswell Island School in Maine.

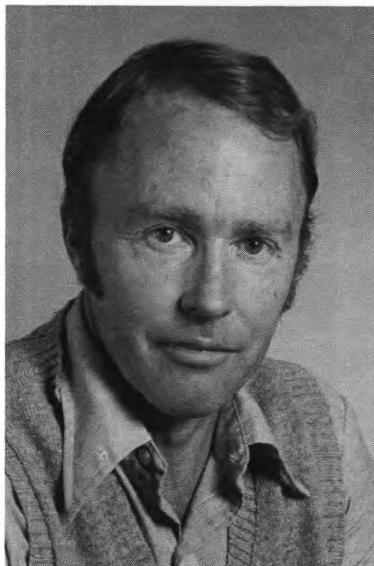
mechanisms to prevent water pollution takes time. Preventing water pollution takes more than new laws; it takes cooperation from workers on the factory floor as much as from corporate boards of directors. It takes research to identify the mechanisms by which pollutants affect the environment; it takes research to understand the sometimes subtle interactions between the water in our lakes and the soil underfoot. These are tough lessons for fourth graders.

Oh yes, I did take care of the dark liquid created in the fourth grade classroom. It went into a pile of leaves where I trust the decomposition process will answer Jeremy's original question.

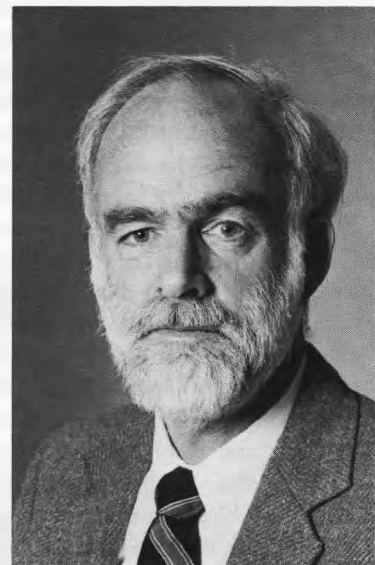
Nick Houtman does water quality sessions on request within a 25-mile radius of Orono. The unit as currently written targets eight-to-ten-year-olds, but Houtman can adapt it for other age groups. Houtman says, "This audience is critical. By speaking with children, I can promote awareness of the University (of Maine's) role and give them (students) a proper context in which to interpret the headlines. I also try to put some humor and enjoyment into the science and thus stimulate an interest in scientific careers." While the results of the program are simple enough to quantify, the program's long-range impact is difficult to ascertain. However the ultimate outcome is judged, teaching the children is an appropriate avenue to approach the future.

Mr. Houtman may be contacted at 207/581-1491.

Research and Public Service Recognizing Leadership, Pioneering, and Productivity



PUBLIC SERVICE — Herb Hidu, master of accomplishing what prevailing wisdom insists can't be done, was the recipient of the 1990 Presidential Public Service Achievement Award at the University of Maine. Hidu, whose strongest achievements are in aquaculture, is internationally known for his work in polyploidy, especially as the pioneer for its commercial applications.



DISTINGUISHED RESEARCH — Stephen Norton, recipient of the 1990 Presidential Research and Creative Achievement Award at the University of Maine, has for more than two decades at Maine turned his trained scientific mind to making sensible connections between and among complex data. Building on the rock-solid foundations of Geological Sciences, Norton has used the vehicle of collegial cooperation to make distinct inroads on the questions of radon, lake eutrophication, geochemistry, acid rain, climate change and watersheds. His work has been especially effective at pulling the separate disciplines together and elucidating the crucial impacts they have on the life and health of human beings and their home planet.

“Before I became involved in this hunger research project, I considered hunger to be a problem isolated to poor, third world countries. It was something I was estranged from, occurring in lands far from my own. After taking a class researching the many dynamics of hunger, I began to realize that victims of hunger were not so far away. Hunger, though often hidden from view, is a serious problem existing right

here in Maine. Visiting a soup kitchen, writing to and talking with many individuals involved in hunger issues — and paying closer attention to my own surroundings have sensitized me to the plight of Maine’s hungry. Yet hunger is an issue that I believe we can tackle and solve. With lots of hard work and effort, I know we can make a difference.”

— Diane Roy

Private Assistance for Maine’s Hungry

by William H. Whitaker
and Jean M. Andrews

Hunger is no stranger to Maine. In late 1983 New England physicians documented the presence of hunger in Maine in public hearings in Portland, Bangor and Augusta and in visits to the homes of the poor in South Paris, Casco, Naples, Lewiston, and Brunswick. (Citizens’ Commission on Hunger in New England, 1984)

As public awareness of the existence of hunger in Maine grew, churches and other voluntary organizations responded with major increases in private food assistance. Existing organizations expanded their efforts; in communities throughout the state new food pantries were organized to distribute groceries to be taken home by the hungry; in larger communities, for the first time since the Great Depression of the 1930s, soup kitchens were organized to provide prepared meals for consumption on site.

Unlike many other nations, the United States carries out no effective monitoring of the nutritional status of its citizens. Many studies of hunger by congressional committees, citizen organizations, and advocates during the 1980s indicate

that hunger is increasing in the United States, but little is known about the extent of hunger in Maine.

This article reports on the efforts of a group of five undergraduate students in the University of Maine Honors Program and their instructor, an associate professor of social work, to take a beginning step toward filling that gap. We follow the lead of Cohen and Burt (1989) in defining hunger as the condition which exists when people are “unable to obtain a nutritionally adequate diet from nonemergency food channels.”

The honors seminar brought together a diverse group of students. Members included Jean Andrews, a senior from Vinalhaven, Maine, majoring in English; Susan Priest, a Palermo, Maine, junior in marketing/business administration; Timothy O’Brien, a junior international affairs major from Presque Isle, Maine; Stephanie Jones, a sophomore chemical engineering major from Newburyport, Massachusetts, and Diane Roy, a Portland, Maine, sophomore sociology major. William Whitaker, the social work professor, conducted the seminar.

Our class, HON 302, was one of several honors group tutorials offered during spring semester 1990. Honors tutorials provide an opportunity for intensive exploration of specific themes or topics by small groups of highly motivated students working closely with a faculty member who is an authority in their area of interest. The topic of our tutorial seminar was “Hunger in the United States and the World.”

The seminar involved experiential learning in addition to extensive discussion of reading assignments and audio-visuals. Course objectives were developed mutually by students and their faculty mentor. We agreed to examine the social issue of hunger from a social policy perspective comparing hunger in the United States with hunger in Third World nations, and to investigate competing strategies for the reduction of hunger with special attention to the interdependent roles of governments and private voluntary organizations.

William H. Whitaker is Associate Professor of Social Work at the University of Maine. He earned his B.A. and M.A. degrees in Sociology from Ohio State University, his M.S.W. in Community Organization from Atlanta University, and his Ph.D. in Social Welfare Planning from the Brandeis University Florence Heller School for Advanced Studies in Social Welfare. Prior to coming to Maine, he spent ten years working with low income grass-roots citizens’ organizations in Columbus, Ohio. He has been recognized as a Danforth Fellow and Danforth Associate and is actively involved in and conducting research on the anti-hunger movement in the United States.

Jean M. Andrews is an undergraduate honors student from Vinalhaven, Maine. A senior English major and resident assistant in Cumberland Hall (a dormitory), she studied in Seville, Spain, during spring semester 1989 through the University of Maine Study Abroad Program. As a consequence of participating in the honors seminar on hunger, Jean is considering volunteer service in the Third World following graduation.

We read about, analysed, and discussed various perspectives on the nature and causes of hunger. Each student maintained a journal in which she or he kept a personal record of intellectual struggle with the ideas which were being teased out and examined. In an attempt to understand better the daily experiences of poor people who constitute the majority of the hungry, students visited a town welfare office to find out about general assistance to the poor, perused food stamp applications, and visited a local shelter for the homeless where we prepared and shared a meal with residents.

About midsemester the students decided that they were not satisfied with knowledge for knowledge's sake alone. In keeping with UMaine's land-grant mission of service to the people of our state, they began to think about what they could do to apply the knowledge they were acquiring.

When they learned that no study existed of the extent of hunger in Maine, we discussed undertaking such a study as a class project. Such studies reporting on governmental and private hunger-related activities had been conducted in several other states. Were we successful, results could be shared with policymakers and the public and might contribute to public examination of hunger in our own backyard. Soon, however, the realities of workloads and time remaining in the semester drew us back to earth. Because of the limited time available, we decided to focus our efforts on a more modest agenda that could later become part of a comprehensive Maine hunger report.

"Hunger comes in many forms. In Maine it comes most often in the form of chronic hunger. This is different from famines we see on television but kills far more people around the world each year. This survey revealed to me how much private organizations help to try and solve hunger. It is scary to think what problems we would have without them."

—Timothy O'Brien

We chose to investigate the dimensions of the private, non-governmental response to hunger in Maine. After deciding that we wanted to know the extent to which food pantries, shelters for the homeless, and soup kitchens were providing emergency food assistance throughout the state and whether levels of private, anti-hunger relief were stable, increasing or decreasing, we developed a survey questionnaire.

We decided to compare levels of relief activity for the months of January and February this year and last. We intentionally chose winter months in which need might be expected to be present but avoided the holiday seasons which tend to generate unusually generous relief activity. We decided also to request data for all of 1989 in order to understand better the magnitude of annual private hunger relief activity in Maine.

"Most of us are just not aware of the number of people who are going without adequate nutrition in our own communities. Through this survey, we learned a lot about the response of charities in picking up where our tax dollars fall short. Hopefully, our awareness will be a first step in helping all of our neighbors have the freedom to pursue their dreams, unseized by pangs of hunger."

—Jean Andrews

With assistance for photocopying and postage provided by the Honors Program Director, Bill Whipple, we mailed our questionnaire to 191 Maine private voluntary organizations which had been identified tentatively as emergency food service providers.

Seventy-five responses were returned reporting on 55 food pantries and 20 soup kitchens. Fifty-nine of the 116 organizations which did not respond were churches and 30 were other types of organizations with nothing in their names to indicate that provision of emergency food was their major purpose. There were, however, 27 organizations which designated themselves emergency food programs but did not respond to our questionnaire.

Although some of the nonreporting organizations may no longer be operating, our figures probably substantially underreport the provision of private emergency food assistance — and, by our definition, hunger in Maine. Nor do we include the many private programs which provide food assistance only during holiday seasons. Our survey, nonetheless, documents a large and growing private food assistance effort throughout Maine.

Food assistance programs

The number of private food assistance programs in Maine increased substantially during the 1980s. Only 12 of the programs in our survey reported being in operation before 1980. Twenty-two were begun between 1980 and 1984 while an additional 32 were established between 1985 and 1989. Twelve programs — the most in a single year — were initiated in 1986.

Our report separates programs according to whether they provide prepared meals which are consumed at the program site (soup kitchens, shelters for the homeless) or provide groceries which are taken home for meal preparation (food pantries — sometimes called food shelves or food banks).

The 20 soup kitchens and shelters which responded to our survey reported serving a total of 645,431 meals during 1989 at a cost of \$172,530. During January and February 1990 they served 80,852 meals, an increase of 80 percent over the 44,870 meals served during the same period in 1989. Reported costs increased only 18 percent, reflecting the substantial amounts of food which are donated to these programs by churches, businesses, the Federal Emergency Management Agency, and others.

Meals Provided by Maine Soup Kitchens and Shelters for the Homeless

1-1 to 12-31-89 1-1 to 2-28-89 1-1 to 2-28-90

Breakfasts	39,485	5,013	9,056
Lunches	120,293	31,928	58,003
Dinners	416,106	3,261	12,793
Total meals*	648,431	44,870	80,852
Reported cost	\$172,530	\$20,219	\$23,863

*Totals do not add up because not all reported meals were designated as breakfasts, lunches, or dinners.

The 55 food pantries responding to the survey reported distributing 40,088 boxes of food during 1989 at a cost of \$200,746. They distributed 8,948 boxes of food during January and February 1990, an increase of 44 percent over the 6,233 boxes distributed during the same period in 1989. Associated reported costs, however, increased by 96 percent to \$40,495 for the two-month period.

Food Boxes Distributed by Maine Food Pantries

1-1 to 12-31-89 1-1 to 2-28-89 1-1 to 2-28-90

Boxes of food	40,088	6,233	8,948
Reported cost	\$200,746	\$20,645	\$40,495

Sources of food assistance

The food distributed by the soup kitchens and pantries comes from both public and private sources. More than two-thirds of the 57 programs answering this question reported receiving donations of food or cash from the general public. Almost three-fifths reported contributions from parishioners or church organizations. One-third received surplus commodities and other support from the federal government through the Federal Emergency Management Agency or the United States Department of Agriculture. Commodities received from federal sources included flour, beans, peanut butter, corn meal, canned pork, and powdered eggs. About one-fifth of the organizations reported benefitting from food drives and hunger walks conducted by the Boy Scouts, students, or Church

Sources of Food and Cash for Maine Soup Kitchens and Food Pantries

(57 food assistance programs reporting)

Source Number of organizations Percentage

Donations from the public	39	68.4
Parishioners and church orgs.	34	59.6
Federal government (FEMA, USDA)	19	33.3
Good Shepherd Food Bank	18	31.6
Food drives and hunger walks	11	19.3
Businesses	8	14.8
United Way & UW agencies	5	8.7
Miscellaneous organizations	4	7.0
Hand to Hand/Maine		
Ending Hunger Week	2	3.5
Community action program	1	1.8
Town welfare	1	1.8

World Service/CROP. Most organizations reported receiving food and other support from two or more sources.

Almost a third of the programs reported purchasing food through the Good Shepherd Food Bank in Lewiston. For the past ten years the Good Shepard Food Bank has helped feed Maine's hungry by redistributing good food which for a variety of reasons cannot be sold by the food industry. Food pantries and soup kitchens purchase the food at reduced prices from the food bank and distribute it to those in need. One program reported that through careful shopping at Good Shepard it is able to provide to the hungry about eight dollars worth of food for every dollar received in donations.

Staff

Slightly more than a quarter of the organizations answering our questionnaire said that they employ paid staff. These tend to be organizations such as the Salvation Army in which food assistance is part of a larger program. Ninety-five percent of the reporting organizations involved volunteers in their work. Both staff and volunteers work from two to 40 or more hours a week in the food assistance programs.

Access

The majority of the responding organizations reported being available to provide assistance five to seven days each week. Few, however, were open more than ten hours per week. Twenty-one programs reported that they are the sole source of food assistance for the people they serve, while 45 others indicated the availability of additional sources of assistance. Several programs stated that they are the last resort for the people they serve. The programs reported that people travel from one to 25 miles to use their services.

Most of the programs have no formal eligibility requirements, an important distinction from the income-based means tests of public programs such as Food Stamps, School Lunch, and WIC (the special supplemental feeding program for women, infants and children). Especially among the religiously based programs, there is a tendency to trust applicants and assume that anyone who seeks food has genuine need for it. Regarding possible abuse of their services, representatives of one program stated that they would rather get burned than turn away someone in need. Another indicated that a person's conscience is the only limiting factor in receiving aid. A third stated that no proof of need is necessary since "hard times come to anyone at some time in their lives. We're just here to help them when they need help." Only four programs reported instances in which applicants were perceived as abusing their trust. In one instance applicants were asked to "search their souls and decide for themselves whether or not they were truly in need."

Some programs used eligibility standards including mental illness, local residence, unemployment, sobriety, proof of having applied for food stamps, current refugee status, speaking with a church elder, proof of identification, senior citi-

zen status, being a guest at the program's shelter, proof of receiving some form of government aid, and vouchers signed by a pastor of any church.

A majority of the programs set no limit on the number of times a person may receive assistance. Others, because of resource limitations or to discourage dependency, limit their help. Of 50 programs reporting, 8 limit assistance to once a month, 5 help only one to four times per year, and 4 aid only in cases of emergency such as fire or illness. Two programs reported offering financial counseling to applicants returning more than twice, and one program reported investigating anyone seeking its help more than once.

Nearly 90 percent of the programs reported that they have never denied a request for food. If unable to respond themselves, they refer applicants to other potential sources of assistance. Eight programs reported denying 35 requests in the first two months of 1990 compared with 55 requests in the same period of 1989. These programs reported a total of 230 denials during all of 1989. Most denials were attributed to insufficient resources.

Who are Maine's hungry?

We asked the programs to identify the percentage of the people they served who were families with children, couples without children, single individuals, and persons over sixty years of age. In the past, private emergency food programs served primarily those single individuals and couples without children ineligible for publicly funded or mandated programs such as Aid to Families with Dependent Children (AFDC), Food Stamps, Unemployment Compensation, and Workers' Compensation. Today the story in Maine has changed dramatically. Our findings indicate that for many Maine families with children and for growing numbers of Maine's population over 60 the federal/state social welfare safety net has become increasingly inadequate.

Of the 65 food assistance programs reporting, only 14 indicated that single individuals or couples without children constituted the largest group they served. Only 26 programs served as many as twenty percent single individuals and only 14 included as many as twenty percent couples without children among their clientele.

Sixty-eight percent (44) of the 65 private food assistance programs in Maine which answered this question reported that families with children constituted their largest service group. Eighty-two percent (53) of the programs counted more than 20 percent families with children among those they aided. Twenty-three (35 percent) of the programs reported serving over 70 percent families and children!

Persons over sixty years old constituted a majority of the clientele served by eight programs and made up 20 percent or more of the clientele of 11 others.

Maine private food assistance programs report increasing need among women, families with children, the elderly, and the working poor. For many parents raising a family through

full-time low-wage employment or part-time employment supplemented by AFDC and food stamps, *food supplies simply run out before the end of the month—month after month.* Twenty of 51 programs reporting discernible patterns of need noted such end of the month increases in the numbers of families seeking private assistance in their attempts to make ends meet. Thirty-three programs cited winter as another time of special need when increased heating costs reduced the amount of money available for the purchase of food. Five programs listed summer—when children no longer receive school lunches and when donations to feeding programs tend to decline—as a time of special concern.

The homebound elderly, retired widows and widowers, homeless youths, refugees, veterans, persons laid off because of illness or injury, unmarried couples, and persons unable to find work were others reported in growing numbers among those needing private assistance.

“Over the course of this semester I've come to view hunger in a new perspective. I always used to think of hunger as only happening in Africa and Third World Nations. Now I am able to see hunger as it really is, a growing problem in our state and nation. As we've discovered, hunger affects all types of people for various reasons and is a reality that we all must see and begin to combat.”

—Stephanie Jones

The assistance programs noted increases in negative feelings and depression among their clientele and more recurrence of need. They also reported increasing numbers of individuals making continuing efforts to achieve self-reliance.

Private food assistance efforts in Maine are a cause for celebration and a cause for concern. Many organizations and hundreds of volunteers throughout the state have translated their caring about the plight of the hungry into action. Feeding programs have been started, maintained, and expanded. The amounts of food and resources made available have increased dramatically with private cash contributions in 1989 exceeding \$373,000.

It is nonetheless clear that private efforts cannot continue indefinitely to shoulder an increasing share of the responsibility for feeding hungry Mainers. In total, the voluntary anti-hunger efforts in the United States during the decade of the 1980s equalled only about one-tenth of the Reagan administration's cuts in publicly funded programs for the poor. The existence of growing numbers of hungry individuals, families, and children in our state is a public shame to which private programs are an important response but only a partial solution.

“In my discipline, business administration, not much emphasis is placed on the individual. This class has afforded me the opportunity to look at the world in a different perspective. I never realized the magnitude of the problem until I came face to face with the victims and the organizations that try to help them.”

— Susan Priest

References

- Citizens' Commission on Hunger in New England (1984). *American hunger crisis: Poverty and health in New England*. Boston: Citizens' Commission on Hunger in New England.
- Cohen, B., & Burt, M. (1989). *Eliminating hunger: Food security policy for the 1990s*. Washington: The Urban Institute.
- Kates, R., et al. (1988). “The hunger report: 1988.” Providence, RI: Brown University.
- Physician Task Force on Hunger in America (1985). *Hunger in America: the growing epidemic*. Middletown, CT: Wesleyan University Press.
- Stommel, H. (1983). *Volcano weather: the story of 1816, the year without a summer*, Newport, RI: Seven Seas Press.
- United Nations, Administrative Committee on Coordination, Subcommittee on Nutrition (1987). *First report on the world nutrition situation*. New York: United Nations.

The Ugly Faces of Hunger

Hunger has many faces. Throughout the world it is reflected in famine, chronic undernutrition, and homelessness; as disease among the poor, and as anorexia and bulimia among the affluent. From a global perspective there is general agreement that up to a billion people, twenty percent of the world's population, daily face the prospect of inadequate food supplies, lack of access to food, or inability to absorb and retain sufficient nutrients. (Kates, 1987) Preventable malnutrition related deficiencies in vitamin A, dietary iron, and iodine respectively result in an estimated 250,000 children worldwide becoming blind or partially blind each year, in reduced health and work performance for millions of adults, and in widespread risk of mild to profound mental retardation. (United Nations, 1987) In the United States it is estimated that at least 20 million people — the majority children — are hungry at least part of every month. (Physician Task Force on Hunger in America, 1985)

What we call hunger in the United States differs in important ways from conditions in many parts of the world that go by the same name. Efforts to reduce and eliminate hunger at home and abroad must take into account different types of hunger and their varied causes. Robert Kates and his colleagues in the Brown University World Hunger Program (1987) distinguish among three significantly different hunger conditions — regional food shortages, household food poverty, and individual food deprivation.

Regional food shortages caused by natural disaster, war, and civil war may lead to famine and starvation. During a regional food shortage, not enough food is available locally to meet the nutritional needs of local residents. Such shortages continue to threaten Ethiopia and other parts of sub-saharan Africa and the Third World. Similar shortages contributed to the exodus of hundreds of Mainers in 1817 following the “year without a summer,” “eighteen hundred and froze to death.” (Stommel, 1983) Regional food shortages are no longer a problem in the United States.

Household food poverty, the most frequent form of hunger in the United States, occurs when people cannot afford to buy food which is available or lack access to the resources necessary to raise food themselves. Household food poverty is related to lack of access to land, to inadequate wages, and to inadequacies in programs such as public assistance, food stamps, and social security.

A third type of hunger, *individual food deprivation*, is caused by disease which affects the ability of people to use the nutrients they consume, by unmet special needs such as the nutritional requirements of pregnant and nursing women, or by neglect, abuse, or discrimination within families or households. In certain cultures, for example, females eat only after males have been satisfied. Anorexia and bulimia among college students are other examples of individual food deprivation.

Explaining the Iranian Revolution

by Henry Munson, Jr.

Why did an Islamic revolution occur in Iran in 1978-79? One commonly accepted answer to this question is that the Shah "modernized too fast." But this explanation of Iran's revolution is inadequate.¹ University students in engineering and other applied sciences were among the most active participants in the Iranian revolution. Such people were clearly not opposed to technological modernization, nor do we find opposition to technological modernization (including industrialization) in the writings of the Ayatollah Khomeini and the other theorists of the revolution.

Khomeini and many of his supporters *were* of course outraged by social modernization as represented by the secularization-cum-westernization of Iran during the reign of Muhammad Reza Shah (1941-1979). But the existence of this outrage does not explain the revolution of 1978-79. Traditional Iranian Muslims have complained about secularization and westernization for more than a century - as have traditional Muslims elsewhere. But an Islamic revolution occurred only in Iran and only in 1978-79.

One might argue that the pace of social modernization undertaken by the Shah in the 1970s greatly exceeded that undertaken anywhere else at any other time, but that was not in fact the case. The innovations effected by the late Shah's father, Reza Shah, in the 1920s and 1930s violated the values of traditional Iranians far more drastically than anything the Iranian government did in the seventies. Reza Shah stripped the *ulama*, or Islamic scholars, of many of their traditional economic and legal prerogatives and forced both men and women to wear western clothes. These various attempts to emulate the West infuriated many Iranians. But Reza Shah easily suppressed the scattered protests sparked by his reforms. There was no Islamic revolution during Reza Shah's reign (1925-1941).

It is true that Iran experienced a massive influx of wealth in the wake of the OPEC price increases of the early 1970s, but all the OPEC countries were transformed by this wealth, not just Iran. From 1970 to 1977, both Iraq and Saudi Arabia had higher rates of economic growth than did Iran. Yet the regimes in both these countries easily suppressed their

"fundamentalist" opposition. Many other OPEC countries with economic growth rates almost as high as Iran's 10 percent increase in per capita GNP (1970-1977) experienced very little turmoil during this period. Thus the argument that Iran's revolution was the result of "overly rapid" economic growth induced by the OPEC price revolution is less than convincing.

Those who contend that rapid modernization caused the Iranian revolution often cite massive rural-urban migration as a disruptive force that "uproots" people, subjects them to "anomie," and induces them to join "fundamentalist" revolutionary movements. The problems with this argument are fairly obvious. First of all, anthropological studies of rural-urban migrants in Iran, as in the Third World generally, have shown that the rural-born urban poor have generally *not* participated actively in "fundamentalist" movements or in political movements of any other kind. These people usually lack secure livelihoods. They are typically laborers, peddlers, servants, or unskilled factory workers. And they often live in squatter settlements. Such people are primarily concerned with their daily struggle for food and shelter. They may riot when the price of basic foods is suddenly raised; they rarely if ever constitute an important social base for revolutionary movements. And they have never been effectively mobilized by the "fundamentalist" movements of the Islamic world, which have drawn most of their support from students and the educated middle class.

As for the alleged "uprooting" and "anomie" of rural-urban migrants, it is an illusion. Anthropological studies of the rural-born urban poor throughout the Third World as well as in Iran have shown that such people live surrounded by relatives and neighbors from their own villages or similar ones. While urban life does undoubtedly differ from the life of a peasant or shepherd, migration from village to town does not usually entail a traumatic cultural shock because migrants remain among people like themselves.

It is true that the urban poor of Iran did eventually participate in the mass marches of the Islamic revolution, but they only did so on a large scale in the late fall of 1978, by which time the Shah's regime was clearly doomed. There had been some clashes between squatters and the police early in the fall of 1977, but these were simply responses to government attempts to raze some of Tehran's squatter settlements. They involved men and women trying to stop bulldozers from destroying their homes rather than revolutionaries trying to topple a regime. Such incidents did not endear the Shah's regime to the urban poor, nor did they transform them into

¹Sources and further data concerning this issue can be found in my book *Islam and Revolution in the Middle East* (New Haven: Yale University Press, 1988).

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revolutionaries committed to the Ayatollah Khomeini's goal of an Islamic state.

A related problem with the conventional emphasis on massive rural-urban migration as a cause of Iran's revolution is that such migration is occurring throughout the Islamic world and throughout most of the Third World generally. From 1970 through 1981, Afghanistan, Algeria, Iraq, Libya, Saudi Arabia, and the Sudan all had higher rates of urban growth (partly due to rural-urban migration) than did Iran. None of them had an Islamic revolution.

One could argue that the Shah brought about his own demise by his expansion of Iran's educational system since the students and recent graduates of this system played a central role in the revolution of 1978-79. But once again, Iran did not differ from the rest of the Islamic Middle East insofar as the expansion of education was concerned. In fact, the educational systems of a number of other Middle Eastern countries expanded more rapidly in the 1970s than did that of Iran.

The argument that Iran's revolution occurred because of the Shah's authoritarian rule runs into similar problems. The educated Iranian middle class and students were indeed outraged by the lack of democracy and the Shah's abuse of human rights. Such outrage existed, in the late 1970s, throughout the Islamic world, yet only Iran had an Islamic revolution.

Another frequently invoked explanation of the Iranian revolution involves the frustration of expectations heightened by the boom following the OPEC price hikes of the early 1970s. This boom led to high inflation, as much as 50 percent a year from 1975 to 1977, according to some sources. (Government statistics in this regard are not entirely reliable.) The Shah's government then initiated an austerity program to reduce this inflation, cutting back on construction and various other projects and thus causing unemployment for some workers. There are those who argue that the government's austerity program frustrated the expectations heightened by the boom of the mid-seventies and thus sparked the revolution. But Iran's recession of 1975-77 was relatively mild when compared with the hard times that prevailed in most OPEC countries when the price of oil dropped sharply in the early 1980s. The shift from boom to austerity in these countries certainly frustrated a lot of expectations. But there were no Islamic revolutions in the 1980s.

Another widely accepted explanation of the Iranian revolution is that the Carter administration "lost" Iran because of its emphasis on human rights and its failure to support the Shah as vigorously as it should have. This view can be related to the general proposition that revolutions only occur when the *ancien régime* is perceived to be vulnerable and no longer capable of suppressing opposition.

As many scholars and former members of the Carter administration have emphasized, the United States did not in fact *force* the Shah to undertake a radical liberalization program. But the Shah, like all educated Iranians, never forgot that he owed his throne to the CIA coup of 1953. He feared

that the American government would organize his overthrow as it had organized the overthrow of Prime Minister Musaddiq after the nationalization of British oil holdings in Iran in the early 1950s. Indeed, after having had to flee Iran in January 1979, the Shah repeatedly accused the United States and Great Britain of having masterminded Khomeini's revolution (see his book *Answer to History*). (Pro-Shah Iranians in Beverly Hills and Paris never tire of making this assertion.)

When Carter was elected president on November 2, 1976, the Shah was worried, as he was whenever liberal Democrats were in the White House. He had already begun to "liberalize" his regime in response to congressional criticism of his regime's human rights abuses. He now began to tolerate public criticism of his government for the first time since the early 1960s; Carter's human rights rhetoric was the main reason for this. But the Shah also knew he had cancer and probably sought to placate some of his domestic opposition in order to facilitate his son's accession to the throne after he died.

The extent to which the Shah reformed his regime should not be exaggerated. No criticism of the government was permitted in the mass media, which remained firmly under government control, and reformist political dissidents continued to be beaten and imprisoned. However, during the course of 1977, Carter's first year in office, a number of Iran's secular reformists were allowed to circulate mimeographed copies of "public letters" demanding free elections and an end to torture and arbitrary imprisonment. This gave hope to the Shah's more radical opponents, notably the Ayatollah Khomeini and his followers.

Alexis de Tocqueville once observed that "evils which are patiently endured when they seem inevitable become intolerable when once the idea of escape from them is suggested." Carter's rhetorical emphasis on human rights led many Iranians to believe that escape from the authoritarian rule of the Shah was possible. Mahdi Bazargan, the first prime minister of Iran's post-revolutionary Islamic government, has observed that "when Carter's human rights drive lifted the hope of the people, all the built-up pressure exploded."

There were many Iranians who dismissed the Carter policy as a purely cosmetic endeavor, but there were also many who interpreted the Shah's toleration of a modicum of dissent during Carter's first year in office as a sign that American support was now conditional rather than absolute. This led many to perceive the Iranian king as vulnerable for the first time since the early 1960s.

The aura of invincibility that had surrounded the Shah, *as well as much of the hostility towards him*, was due to the general perception, both in and out of Iran, that he was Washington's man. The United States had put him back on his throne in 1953 and the United States would not tolerate his overthrow. This was the conventional wisdom in Iran. The Shah's perceived subservience to the United States outraged Iranian nationalist sensibilities. At the same time, fear of American intervention inhibited all those who yearned for an alternative

mode of government. Carter's rhetoric diluted this fear and thereby shook the foundations upon which the Shah's regime was based.

While the Carter human rights policy did undoubtedly precipitate the Iranian revolution, it did so because of the specific circumstances in Iran. The Carter administration placed far more pressure on Latin American dictatorships than it did on the Shah, primarily because of Iran's strategic and economic significance. Yet of the various Latin American autocrats chastised for their human rights violations, only Somoza fell. Others, notably Chile's Pinochet, do not appear to have been weakened by the Carter administration's efforts to force them to reform.

The emphasis on human rights during Carter's presidency did not trigger revolutions in South Korea or the Philippines. (Marcos fell during Reagan's second term.) Nor were there revolutions in Jordan, Saudi Arabia, Morocco, or any of the other Middle Eastern autocracies supported by the United States. Only in Iran. In other words, *the Carter human rights policy would not have sparked the Iranian revolution if the situation in that country had not already been combustible.*

Moreover, it is necessary to view the impact of the Carter policy on Iran in its historical context. Iranian interpretations of this policy and of the Shah's "liberalization" were shaped by the CIA coup of 1953 and the quarter century of American domination that followed it. If Iranians had not viewed the Shah as an American puppet, they would not have interpreted the Carter policy as a sign that their king was now vulnerable.

It should also be stressed that President Carter's administration did continue to support the Shah until the end of 1978, by which time he was a prisoner in his own palace. There were conflicts between Carter's "hardline" National Security Advisor Zbigniew Brzezinski and the more liberal people in the upper echelons of the State Department. But Brzezinski himself has noted that "the record does show that the Shah had enough encouragement from Carter and from me to have taken - had he wanted to and had he had the will to do so - the tougher line."

The implication in Brzezinski's statement is that the Shah could have suppressed the opposition by a greater use of force. Perhaps. But Brzezinski, like many other American observers, overlooks the fact that the Shah did indeed use a great deal of force in trying to suppress the 1978-79 revolution. All scholarly and serious journalistic accounts concede that thousands of unarmed demonstrators were killed by Iranian police and troops during the revolution.

While it is possible that slaughtering many more thousands could have suppressed the opposition, one could also argue that the Shah sometimes responded too harshly. During the winter and spring of 1978, the revolution evolved out of a cycle of mourning marches for "martyred" demonstrators killed in previous demonstrations. Each time people gathered to mourn their dead, their mourning rites turned into riots, and

the police and army killed more people, thus creating more martyrs to mourn, and thus perpetuating the cycle of protest. Perhaps if these protests had been suppressed without death, the cycle might have been aborted. With respect to the later phase of the revolution (when everyone began to realize it was one), the brutal suppression of demonstrations led many previously neutral Iranians to support the revolution despite their lack of sympathy for "fundamentalism." This is a point often stressed by westernized middle-class Iranians who fled Iran after realizing what Khomeini meant by "an Islamic state."

One problem with the argument that the Shah could have suppressed the revolution by a greater use of force is that it supposes the continued loyalty of the Iranian army. Revolutions cannot succeed if the armed forces of the *ancien régime* remain loyal even when used to slaughter their own people. To what extent could the Shah count on such loyalty?

It is true that, in terms of outward appearance, the bulk of the Iranian army remained intact right up to the Shah's flight to Egypt on January 16, 1979. However the will of the armed forces had started to crumble long before this. There were many acts of insubordination (usually involving refusal to shoot demonstrators) by soldiers and officers during the fall of 1978 (see Misagh Parsa, *Social Origins of the Iranian Revolution*, pp. 241-43). This is why the Shah allowed the mass marches of December to take place after initially banning them. He could not count on his troops to fire on millions of unarmed men, women, and children led by the venerated "clerics" of Islam.

General Gharabaghi, who was in charge of the Iranian armed forces in January 1979, estimated that at this time the army was losing about a thousand deserters a day, while about twelve hundred men were deserting every day in early February. On February 9, the Shah's Imperial Guard attacked a large military base in Tehran to punish hundreds of air force technicians who had expressed their support for Khomeini. Members of several guerrilla groups as well as civilians joined forces with the technicians. The insurrection spread to other bases and police stations in Tehran until February 11, when the Supreme Council of the Armed Forces declared its neutrality in the conflict between the revolutionaries and the vestiges of the Shah's regime. The Shah's army, the best-equipped in the Third World, collapsed.

While the argument that the United States prevented the Shah from using enough force to suppress the revolution does not seem very convincing, we have seen that the Carter human rights policy, *as perceived by Iranians*, did weaken the Pahlavi regime. But that policy, in and of itself, could not have caused the revolution of 1978-79. American policy and the subsequent "liberalization" of the Shah's regime allowed hitherto submerged discontents to surface. This would not have resulted in a full-fledged revolution had it not been for the symbolic and later actual leadership of the Ayatollah Khomeini and his "clerical" as well as lay supporters.

Strictly speaking, there are no “priests” in Islam. That is to say that collective worship does not entail “ordained” intermediaries. Any pious adult male familiar with the rules of worship can lead congregational prayer. But very often, such prayer is led by a man of religion who has studied the Qur’an and various other basic texts of Islam. In Shi’i Islam, which prevails in Iran, there is a loose hierarchy of such men of religion, at the apex of which are the *ayatollahs*, or “signs of God.” The latter are believed to be the deputies of the messianic hidden Imam, who will return at the end of time. Since the nineteenth century at least, it has been believed that every Shi’i Muslim in Iran should be the follower of one of these deputies of the hidden Imam. Being the follower of such a man entails paying him an annual religious tax as well as obeying all his orders (which usually only concern religious matters).

In other words, the Shi’i *ayatollahs* have charismatic authority in the sense that they are believed to represent the will of a divine being - the hidden Imam. Khomeini was able to exploit this authority to a greater degree than any other *ayatollah* in Iranian history. He was able to use his position to mobilize millions of normally docile Iranians in a way that no secular politician could have done.

In addition to his institutional charismatic authority derived from his status as an *ayatollah* and as a “source of imitation” to be followed by other Shi’is, Khomeini also had greater charismatic authority than any of his fellow *ayatollahs* by virtue of the nature of his struggle against the Shah. Ever since he had first condemned the Shah for suppressing Islam and subordinating Iran to the United States in 1963, Khomeini had come to be seen as a heroic figure identified with some of the archetypal mythic heroes of Shi’i Islam. He lived simply. He spoke simply. And unlike most Iranians, he was not afraid to defy the Shah or the United States.

Khomeini articulated nationalistic resentment of American influence in Iran in ways that appealed even to Iranians unsympathetic to his “fundamentalist” conception of Islam. In 1964, after having been released from prison, he condemned a new law granting the equivalent of diplomatic immunity to American advisors in the following terms:

Do you not know that this agreement reduces the Iranian people to a rank lower than that of an American dog?

If someone runs over an American dog with his car, he is subject to investigation and prosecution, even if he is “the shah” himself. But if an American cook runs over “the shah of Iran” himself, or any other important person, he will not be subject to prosecution.

On February 18, 1978, Khomeini declared that the Shah had “transformed Iran into a colony of America.” On September 12, 1979, he said that “for more than fifty years, the Pahlavi puppet dragged our country down, filling the pockets of the foreigners - particularly Britain and America - with the abundant wealth of our land. . . .”

In articulating Iranian resentment of American influence

in Iran, the Ayatollah touched a very raw nerve. While he tended to fuse this nationalistic resentment with religious xenophobia, it would be a mistake to reduce the former to the latter. The Iranian revolution was, among other things, a nationalist uprising against a regime associated with foreign domination. In this respect, it resembled the other revolutions of the Third World that have occurred since the end of World War II. This nationalistic aspect of the Iranian upheaval was reflected in many of the slogans chanted during the mass marches of 1978, e.g., “We will destroy Yankee power in Iran” and “Death to the American dog; Shah held on a leash by the Americans!” The Shah had never been able to overcome the taint of illegitimacy due to his having been returned to his throne by the CIA. This taint was exacerbated by the increasingly conspicuous role of Americans in Iran in the 1970s. Despite the fact that most Iranian *‘ulama* (religious scholars) had actually supported the CIA coup, Khomeini was able to exploit nationalistic resentment of the American role in the Shah’s regime far more skillfully than the westernized secular intellectuals divorced from the religious sensibilities of the people.

Khomeini came to be identified with the hidden Imam. There were debates in Iran during the revolution as to whether he was actually the long-awaited hidden Imam himself or merely his deputy. When Khomeini returned to Iran after more than fourteen years of exile, one *ayatollah* joked that the hidden Imam had not been expected to return on a jumbo jet (chartered from Air France). Even those who ridiculed the notion that Khomeini was the hidden Imam had to acknowledge the messianic aura surrounding him in the popular imagination (at least in the cities as of the late fall of 1978).

Khomeini, like most charismatic revolutionary leaders, became a symbol that had different meanings to different strata of Iranian society. For the westernized young seeking cultural authenticity, he *was* authenticity. He was the revitalized tradition for which they yearned. He represented the real Iran as opposed to the Iran of those who skied at St. Moritz and bought their clothes in Paris.

For more traditional Iranians, the issue of cultural authenticity was less pressing since they had never questioned their Iranian Muslim identities. Only those who feel inauthentic are obsessed by authenticity. For more traditional people, Khomeini was above all a man of God, an idol-smasher, and the personification of the traditional values denigrated by the Shah and the westernized elite, all of this enhanced by the messianic aura.

Khomeini had opposed the Shah since 1963. But the 1963 uprising had failed as had that of the religious students in the holy city of Qum in 1975. In these cases, the Ayatollah’s charismatic authority and his articulation of nationalistic resentment were not enough to induce the people of Iran to revolt against their king. However, in the context of the Shah’s

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Biological Clocks: timing is everything—and everywhere

by Jamie Wätler

After travelling east through several time zones, the experienced pilot and crew of an airline fall asleep during flight. A fiddler crab in a laboratory miles from the sea without any environmental cues persistently becomes active and feeds at the time of low tide. Leaves of bean plants moving to capture light in the day and folding down at night follow the same rhythms even in complete darkness. Doctors treating cancer discover that chemotherapy can be more efficient and less debilitating to patients if administered at certain times of the day.

Is there a relationship among these phenomena? Surprisingly yes: they are all examples of biological clocks in action. Plants, animals, and even single cell microorganisms have an innate ability to time complex internal and external events for maximum efficiency, just as people use watches and clocks to organize our days. Several researchers of the University of Maine are currently exploring the clock activity of different animal systems.

In the Psychology Department, Dr. Alan Rosenwasser is interested in the neural and circadian (approximate 24-hour rhythm) mechanisms of mice, rats and hamsters. How different environments or drugs alter the activity rhythms of animals may provide clues about the effects of altered clock functions in other systems.

According to Rosenwasser, "There's a whole lot of data coming from clinical research showing that in humans with affective disorders, particularly depression and mania, certain kinds of characteristic changes in their circadian rhythms occur."

In humans and other mammals, physiological processes such as hormone secretion and body temperature exhibit daily cycles. Individuals with abnormal circadian rhythms may have these cycles occurring out of phase with their sleep-wake cycle; potentially this could be part of emotional disturbance. Rosenwasser noted that it is difficult to determine the actual cause and effect relationship between the clock and the disorders by observing human subjects.

Rosenwasser is working to discover more about this rela-

tionship by examining the effects of drugs involved in depression and mania on the circadian activity rhythms of rats. According to Rosenwasser, there is evidence that drugs believed to promote or alleviate depression in humans cause changes in activity rhythms of rodents in a manner consistent with clinical knowledge of human affective disorders.

Even though his research is not immediately applicable to the human system, "Any fundamental research in mammalian clocks is in some sense related to things like jet lag and shift work and those kinds of public health issues." The biological clocks in our bodies are normally entrained by environmental or social cues to follow daily cycles. In constant conditions without these cues, our circadian rhythms persist, but are no longer synchronized with the external environment and tend to exhibit a longer cycle which averages 25 hours. This ability to persist in constant conditions or "free-run" is a hallmark of all true biological clocks. Therefore, humans and other organisms are equipped with internal clocks which can shift to accommodate different schedules. But there are limitations.

Large numbers of individuals who work night shifts or swing shifts or fly over different time zones are at a disadvantage: they are working during a time when the environmental cues basically tell the body to go to sleep. This results in a greater frequency of accidents, lower productivity and decreased worker happiness. There is evidence that, in many situations, incorporating the principles of chronobiology into the scheduling of these workers may alleviate the difficulties. Rosenwasser believes, "Our society now is entirely dependent on 24-hour operation . . . a certain number of accidents are an inevitable consequence of doing that . . . we need to support the research that will help us do that in the most safe and rational manner."

The deprivation of sunlight especially in winter months has been shown to cause symptoms of depression, sleepiness, weight gain and withdrawal from social activities in some individuals. This seasonal affective disorder (SAD) has been cured in many cases simply by exposing patients to intense bright light at certain times of day. An increased understanding of the human circadian system and its manipulation may prove to have a number of therapeutic benefits.

A horseshoe crab, *Limulus*, although considered a simple animal, has a circadian clock within its brain that increases the light sensitivity of its eyes at night to give it excellent vision very close to that of daytime. Dr. Leonard Kass of the

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department of Zoology has been exploring the visual system of *Limulus* and its associated biological clock to provide insight of how other systems, including those of humans, may work.

In the eye of *Limulus*, photoreceptors are much larger than humans' or other animals', which makes them ideal for studying retinal function and mechanism. How light energy is received and passed on as a neural message to the brain and how the brain of *Limulus* stimulates increased sensitivity in the photoreceptors at night are mysteries.

"We try to figure out what nature is actually doing," said Kass. "We know that the circadian clock causes neurotransmitters to be released next to the photoreceptor cells. We know that those molecules interact with receptors in the photoreceptor membrane and that interaction causes changes in intracellular functions . . . but we do not know the cellular link between biochemical changes inside the cell and the functional changes (increased sensitivity to light)."

Dr. Kass is also investigating whether behaviors of *Limulus* are being modulated by a circadian clock. "We think it has an effect on activity cycles," according to Kass. "It's quite possible that the circadian clock we are studying in *Limulus* is very similar to the circadian clock in ourselves."

Animals could certainly benefit by utilizing a biological clock to be at the right place at the right time. While exploring the migratory mechanisms of eels, Dr. Gail Wipplehauser and Dr. James McCleave of the Zoology Department found evidence that suggested immature American eels in the rivers of Maine use a circatidal clock to catch a free ride on the flood tide, a phenomenon known as selective tidal transport behavior.

According to Wipplehauser, the immature or glass eels remain on the bottom of the river during the ebb tide and do not rise into the water column until the flood tide occurs, thus preventing the tides from taking them out to sea. In the field, Wipplehauser tested whether the behavior could have been caused by the animals detecting the differences in water salinity or current due to the tides.

The eels' behavior did not directly follow these changes, which indicated that a biological clock may be involved. In a laboratory free of environmental cues, the eels began to exhibit activity rhythms approximately every 12 hours, which would be a tidal schedule. Does this behavior suggest that the eels have an endogenous clock? "It certainly seems to be the case with glass eels," said Wipplehauser.

"I'd be surprised if . . . lots of fishes and invertebrates that migrate in coastal waters and in estuaries don't have a lot of aspects of their behavior controlled by tidal clocks," said McCleave. He also mentioned that circadian clocks may be involved in other migration systems. "Animals that are doing horizontal migration and may be using a sun compass,

or a star compass, need a biological clock so that they can have an idea where the positions of the sun or stars or moon should be to get the directional information. There's lots of evidence for that in birds and migrating creatures."

There is now overwhelming evidence that the biological clock does exist and is found in virtually all lifeforms and subsequently is conserved evolutionarily. What is this ubiquitous organic timing mechanism made up of? Do we have any knowledge of how it ticks and how it communicates timing to the rest of the body or cell? Do we know how many clocks are involved? Despite years of research the answer to these questions is **no**.

Dr. Harold Dowse and Dr. John Ringo of the Zoology Department are experimenting with the clock system of the fruit fly *Drosophila* to find some answers. In the 1970s, clock mutants were discovered in *Drosophila*, mutations in a gene (called the period or per gene) caused changes in the time length or period of rhythms involved in activity and eclosion (when the animals hatch from their pupal cases). This clock system has a genetic basis and is affected by the per gene product. By perturbing the system genetically or environmentally and observing the response of the system to these changes, Ringo and Dowse hope to learn more about the genetic properties of the clock and the molecular mechanisms involved.

According to their findings, Dowse hypothesized that, "There isn't just one clock, but a lot of high-frequency clocks." The circadian rhythm is actually a population of the high-frequency clocks and possibly "The product of the per gene is a coupler of these oscillations."

Evidence has shown that there are specialized groups of cells in vertebrates and in other organisms which are master pacemakers. Many believe that the entire clock system is specifically located within these cells. However, Ringo stated that both he and Dowse believe that the clock system of *Drosophila* is much more extensive and involves all body cells as well as master pacemaker cells: "There is a perfectly good circadian clock within each cell, and this clock is the result of intracellular coupling by the per gene product. In fact every cell in our bodies, every cell in the body of *Drosophila*, has a clock. These clocks are coordinated by the master pacemakers."

In terms of evolution, Ringo stated that the idea of individual cellular clocks "Has a lot of appeal because it's the simplest hypothesis. It's easier; you don't have to invoke a new type of clock mechanism for multicellular organisms if they're the same as unicellular organisms."

In conclusion, the discovery of biological clocks has introduced us to a temporal realm of organization, effects of which cascade from cellular activities to the outward behavior of an entire organism. Solving the mysteries involved with this phenomenon will bring us closer to harnessing it and increasing our understanding of its role in life systems.

“ . . . Let the narration itself secretly instruct the reader, and more effectually than can possibly be done by precept.”

And that is what it did do

Fifteen women and men, high school teachers of economics, American government, English, political science, world literature, social studies, and American, Russian, and world history, met together for an NEH summer seminar.

The text from Thucydides' narrative of the war of the Peloponnesians and the Athenians served as a vehicle to examine a moral-political climate similar to our own.

Through careful dialogue, prudent discussion, attention to definition, and recognition of interpretive stages in thought, Palmer prodded and pulled seminar participants away from strict noncontradiction and toward a sense of intellectual evolution.

While the text provided a common vehicle, the participants' different disciplines produced different ways of thinking: an assortment of approaches to the material. The artist-teacher looked for genius and would not analyse; English teachers searched for themes, motifs, and expressions of human nature. History teachers clung to time, places, quantifications. As characters in their own piece, the participants played off against each other, and the results were synergistic.

Each from a separated-out discipline overlaid with the prejudices of training and trainers, their personalities, and the conditioning which each had undergone, the participants were remembering and relearning thinking. They strove to learn, to become tolerant of absent perfection, to touch the human condition: its outrageous joy and flights of beauty, the insane depths of horror, cruelty and degradation to which it can sink.

As foci of the writing were studied, participants moved away from the artificial divisions superimposed on a metaphysical unity and began to reweave the threads of an ancient tapestry, a tapestry of synthesis, overlooking, and totality.

Join us as we read excerpts from the abstract of a book by Professor Palmer about Thucydides, the recorded observations of whom formed the vehicle for this summer adventure.

Love of Glory and the Common Good: Periclean Democracy and Athenian Tyranny in Thucydides

by Michael Palmer

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This essay in the political thought of Thucydides investigates his presentation of the connection between Periclean democracy and imperialism, on the one hand, and the problem of tyranny, both domestic and foreign, on the other. What is Pericles' understanding of the Athenian regime, and what is Thucydides' own understanding? What is the Athenians' understanding of the relation of their regime at home to their empire, or as Pericles and others call it, their tyranny abroad? What is Thucydides' own understanding? What lessons does Thucydides intend readers to draw out for themselves from these narrations (to borrow Thomas Hobbes' formulation)?

The primary original contribution of this book is to elucidate the relationship between Periclean Athens and the "tragedy of Athens," the precipitate decline in Athenian domestic life that occurred after the death of Pericles. I elaborate more clearly than has been elaborated heretofore the many connections between the Periclean understanding

of Athenian democracy and imperialism and the emergence of the Alcibiadean understanding, which dominates the generation of Athenian leaders after Pericles. I demonstrate that the disintegration of Athenian political life after the death of Pericles, with its disastrous consequences for both the democracy at home and the empire abroad, was deeply rooted in deficiencies in the Periclean understanding of politics as presented by Thucydides in the speeches of Pericles.

After preliminaries which outline the reigning approaches to Thucydides in the scholarly literature and place my book within the context of that vast literature, the essay examines Thucydides' presentation of Periclean Athens. Pericles holds that the impending war is both necessary and just, and his war strategy relies decisively on the empire. That war strategy, designed to secure the empire and even to expand it after the war, disrupts the traditional manner of living of the Athenians, effectually sounding the death knell for whatever remains of the ancestral Athenian way of life. Indeed, Pericles' famous Funeral Oration, the closest thing in Thucydides to an elaboration of "the best regime in speech" of classical political philosophy, begins with an attack on the ancestral, and celebrates the newer Athenian way of life, the pursuit of ever greater glory from ever greater empire. The glory of Athens rests on the glory of the empire, an empire over fellow Greeks.

In the Funeral Oration, Pericles describes Athens as a regime in which the fundamental tension between the public good and the private good, a major concern of all political theorists, dissolves. In Pericles' view, love of glory is the means by which human beings can rise above their fear of death and love of gain, without having to rise above their radical love of their own. After presenting Pericles' Funeral Oration, we might say that in the immediate sequel, the account of the terrible plague that ravaged Athens and claimed the life of Pericles, Thucydides presents his own. He takes Pericles' dream of Athens and turns it into a nightmare. Pericles suggests that love of glory could be the foundation of an "ideal" regime that would reconcile what is highest in the city with what is highest in the individual; Thucydides' account of the plague suggests that fear (ultimately fear of the gods, about whom Pericles is silent) may be the only compulsion strong enough to serve as the ground for political moderation, to persuade us to care about the common good. Thucydides' "eulogy" of Pericles raises further questions concerning the Periclean solution to the political problem.

The essay continues with an examination of the Athenians' self-understanding and defense of their imperialism. We begin with the first conference at Sparta where, in the speech of the Corinthians, an indictment is brought against Athenian imperialism. The Athenians who respond to the Corinthian attack on "Athenians" are appropriately anonymous citizens who present a typically "Athenian" view of the empire. I then compare the genesis of Athenian imperialism given in this speech with Thucydides' own account of the events of the roughly fifty years from the end of the Persian War to the ad-

vent of the Peloponnesian War.

In the infamous Melian dialogue, other anonymous "Athenians" provide the boldest elaboration of the principles of Athenian imperialism; these principles are radically challenged by the Melians. We also consider the Athenian debate concerning the fate of Mytilene, where opposing views of how the Athenians ought to rule their empire are presented. The exchange between Hermocrates and Euphemus in debate in Sicily also casts light on our theme.

World History and Economics, San Jose, California:

Our seminar is exciting and rejuvenating. Some of my colleagues see prose; others pure history. Some see it as a vehicle to use with other writers.

Later on in the essay, we see how the career of Alcibiades calls into question most forcefully Pericles' proposed solution to the political problem. The Athenians are the tyrant city of Greece and the city whose citizens most fear tyranny. They seem to be aware, perhaps only in a dim and inchoate way for most of them, that the principles that justify their domestic regime are at odds with the principles that inform their foreign policy, and that their adherence to the latter somehow poses a threat to the former. This is the context in which Alcibiades' problematical relations with Athenian democracy, and Thucydides' own judgment concerning these questions, must be understood. We also chart the Athenians' destruction in Sicily, in order to observe the extent to which it can be understood to have resulted, in Thucydides' own view, from the disintegration not of the congruence of Alcibiades' private good and the public good, but of the disintegration of the congruence of the private good of Nicias and the public good. This, taken together with Thucydides' remarkable eulogy of Nicias, raises important questions for our understanding of "Athenian" politics.

World History, Salt Lake City:

These are bright individuals with exciting ideas, excellent ideas. The experience is feeding my soul with scholarship.

Readers concerned with contemporary democratic and world politics will readily see that there are important lessons for us to draw from these Thucydidean narrations. It has recently been remarked that Thucydides is one of the few writers who still commands the attention of both political scientists and political theorists, not to mention classicists and historians. This is undoubtedly a consequence of his much heralded "realism." He presents his political theory in the guise of a vivid narrative of the Peloponnesian War, which was for

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Tools of the Trade: Technology Usage and Financial Performance in Small Business

by Diane J. Garsombke
and Thomas W. Garsombke

Abstract

New technological advances and increased competition are spurring greater use and acceptance of technologically sophisticated machines, equipment, and materials by small manufacturing firms. This article focuses on three strategic issues important to small business decision makers: 1) the degree and sophistication of the new technology use; 2) the various factors inhibiting technological adaptation; 3) the relationship of these new technologies to positive financial performance.

Introduction

In the United States, many small businesses follow a tradition of entrepreneurship and the rugged individual's common sense approach to business and enterprise. Established by our founding fathers in New England, this approach states "If it ain't broke, don't fix it." While this reactive type of management may have been appropriate in the past, many American business owners are being compelled to take a more proactive stance in manufacturing and operations control. As Tom Peters [15] states, the world is changing too rapidly for anyone to remain complacent. He proposes a new motto: "If it ain't broke, you just haven't looked hard enough. Fix it anyway."

American manufacturers are facing technological changes which force them to consider more cost-effective production

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systems and operations. The implementation of new technologies is driven by recent computer advances, greater domestic and international competition, and increased labor costs. Consequently, small manufacturers, in particular, (due to their limited resources), must focus on methods to reduce manufacturing costs, control overhead, improve productivity, and increase product and service quality.

Background

One of the first major technological changes to influence small businesses was the introduction of numerical control, which allows a machine to operate automatically via coded instruction. Numerical controls are of two types: positioning controls which are activated by direct data input such as cards, tapes, or cassettes and affect point-to-point positioning and computer controls initiated by dials or keyboards which control both point-to-point positioning and the path of the machine.¹

The microcomputer, a smaller, easier to use and less costly alternative to the mainframe computer is pivotal to the growing trend that Lincoln and Warberg [9] describe as small businesses enter the high-tech world.²

In small businesses, microcomputers are used predominantly for transaction processing (e.g., listing of customer names and addresses, items purchased, date of sale, marketing costs) rather than as decision-making tools in the operations and financial areas (e.g., analyzing inventory levels or evaluating sales growth) [11] [20].

New usages and applications for small businesses are created as the technology develops. For example, with the development of a data base and 3-dimensional graphic technologies, small businesses can apply existing computer-aided design and computer-aided manufacturing (CAD/CAM) technologies to materials handling, automatic assembly, product innovation and office automation [2] [13].

Increased competition (both domestic and international) is another factor which is accelerating the use of computerized tools and machine technology by small- and medium-sized businesses. Some experts characterize the American economy as "Struggling against fierce Far Eastern Competition." [3]

As large manufacturers employ industrial robots more extensively, small entrepreneurial firms are buying robots to compete with larger firms. [8] [12] Stronger financial performance also has lured small business owners into more extensive utilization of computerized processes and systems.

A few empirical studies have been done which show a tentative link between the use of technology and financial performance. Small firms which use computerized systems for

forecasting and aggregate planning, for example, outperform those firms that do not employ such techniques. [16] Some of the activities critical to better financial performance include analyzing changes in target customers, making sales projections and preparing a monthly cash flow analysis. Small business can be greatly aided in these planning functions by the use of computers.³

Interest in new technologies such as information processing tools, computerized systems and robotization seems justified from a number of standpoints. These technologies allow small businesses to reduce costs and improve the efficiency of their operations because they can bring about better materials management, smoother customer relations, tighter control of finances, and greater overall planning for the future of the firm. [17]

This study examines the linkage between the use of technologies in manufacturing operations and positive financial performance in small business firms, as well as the relationship between technology usage and the number of inhibitors to implementing new technologies in small manufacturing firms.

Methods

A current literature review of small manufacturing firms' technologies, coupled with preliminary interviews of owners/managers of small manufacturing firms, state government officials, and professional association directors form the background for a series of questions to meet study objectives. The questions comprise four topical areas.

The first questionnaire section contains a list of descriptive indicators which delineate characteristics of seven types of technology: computerized accounting systems (CAS), computer-assisted design (CAD), computer-assisted manufacturing (CAM), computer-assisted production planning (CAP), lasers (LAS), robotics (ROB), and overall systems (SYS).

The second section provides factors which might inhibit implementation of these new technologies. Part three lists performance indicators focusing on financial growth, profitability, and control of operating costs throughout the manufacturing process.

Small business owners are reluctant to divulge specific financial data; consequently, the study employs subjective or self-reported fluctuations in performance as was utilized by Dess and Robinson [5] in their study on privately held firms and organizational performance. Managers report their perceptions (on a three-point scale of 1=below average; 2=average; 3=above average) of their firm's performance vis-a-vis the industry's performance.

Output (i.e., end results), throughput (i.e., results that occur during the manufacturing process), and overall performance (i.e., both in-process and end result) are the three groupings of perceived relative performance. The output measure is a weighted average of profit margin, sales growth, return on investment (ROI), market share, accounts receiv-

able, and payroll costs. Throughput measures include safety stock levels, inventory, rework costs, and scrap costs. The overall financial performance measure is the weighted average of all 10 performance variables.

This study follows the guidelines established by Sapienza, Smith and Gannon [18] (in their replicate study of Dess and Robinson) to obtain more reliable subjective measures of performance. Namely, the referent group is carefully selected and defined, respondents are instructed not to adjust their performance ratings for organizational goals or a common set of accounting procedures, and only individuals with direct responsibility for financial performance measures are included as respondents in the study.⁴

For the variables of technology, barriers, and performance, the respondents are divided into low, medium and high groups. Cutoffs for these categories are established using the Delphi Technique, a procedure which uses a panel of expert judges to make consensual decisions.

The fourth and last section of the questionnaire contains questions dealing with business-specific characteristics and data such as annual sales, number of employees, types of products produced, and ownership forms.

Sample

The study's target population includes small- and medium-sized manufacturing companies in the state of Maine. The rationale for a single state sample is fourfold: 1) the authors were interested in conducting research which would be of economic benefit to the state in fulfillment of the University's land-grant mission; 2) the researchers felt that the response rate would be higher in the state due to the status of the University of Maine as the premier research institution; 3) an up-to-date listing of Maine manufacturers was readily available for random sampling; 4) previous studies of small firms have followed the single state sampling technique. [Liberatore and Titus sampled 169 firms in Pennsylvania (see footnote 1); Robinson et al. analyzed 81 small firms in South Carolina (footnote 3); Lincoln and Warberg studied responses of 303 small business owners in Idaho (footnote 2); Schroeder et al. examined the new technologies of 20 small manufacturers located in central and western Massachusetts (footnote 7).]

The sourcebook, *The 1989 Maine Directory of Small and Medium Sized Manufacturers*, lists all manufacturing firms by SIC Code and county. A random number generator selected 300 questionnaire recipients; of these, 144 firms or 48 percent responded.

Results

Characteristics of Firms

A majority of respondents have less than \$800 thousand in sales per year (56%), fewer than 50 employees (64%), and are incorporated (95%). More than 40 different SIC classifications were represented. Products ranged from mattresses and springs, canned foods, packaging material, and metal

fabrication to electronic parts and equipment, printing, and building materials. Analyses of response and nonresponse firms showed no significant differences between the two groups regarding product type, number of employees, amount of yearly sales, and type of ownership.

TABLE 1
DESCRIPTIVE VARIABLES OF TECHNOLOGY

Usage	Frequency	Percent	Rank
CAS-accounts payable	70	49	1
CAS-payroll	65	45	2
CAS-accounts receivable	58	40	3
CAS-material's order	52	36	4
CAS-fixed asset accounting	49	34	5
CAM-production scheduling	37	26	6
SYS-material requir. plan. (MRP)	34	24	7
CAM-inventory order system	32	22	8 (tie)
CAM-product tracking systems	32	22	8 (tie)
CAP-systems resource alloc	30	21	10
CAD-electronic drafting boards	17	12	11
SYS-Expert Systems	15	11	12
ROB-other: sewing	12	8	13
CAM-other: punching press	10	7	14 (tie)
CAM-other: typesetting	10	7	14 (tie)
ROB-inspection	10	7	14 (tie)
ROB-finishing	8	6	17
SYS-computer info. mgt. (CIM)	6	4	18
CAD-computer generated models	4	3	19 (tie)
CAM—Flexible Manuf Sys (FMS)	4	3	19 (tie)
CAS-other: fin. statements	4	3	19 (tie)
LAS-other: typesetting	4	3	19 (tie)
CAD-solid model capabilities	4	3	19 (tie)
ROB-extendible arm	2	1	24 (tie)
ROB-light assembly parts	2	1	24 (tie)
LAS-material cutting	2	1	24 (tie)
ROB-painting	2	1	24 (tie)
ROB-palletizing	2	1	24 (tie)
LAS-product inspection	2	1	24 (tie)
ROB-small parts handling	2	1	24 (tie)

NOTE:

CAD-Computer Assisted Design
 CAM-Computer Assisted Manufacturing
 CAP-Computer Assisted Production Planning
 CAS-Computerized Accounting Systems
 LAS-Lasers
 ROB-Robotics
 SYS-Overall Systems

Technology Usage

Firms in the sample were classified by their usage of technology, measured by the total number of technology applications each respondent checked. For a summary chart detailing frequency, percentage, and ranking of each technology variable, see Table 1. From these data, three groups are identified: low technology users, those with one or no use of technology, (n=56; 38%); medium technology users, two to six uses, (n=41; 29%); high technology users, seven or more uses of technology (n=47; 33%).

Through the Delphi Technique, technology group cutoffs were made. The cutoff of one use of technology for the low tech group was made because the sample consisted of smaller

firms with fewer resources, and one technology use indicated the firm is experimenting with technology on a limited basis. Seven uses of technology was used as the cutoff point for the medium tech group because the Delphi Technique experts feel that between two and six uses would fall primarily in the computerization of accounting systems.

CAS applications such as accounts receivable, accounts payable, materials purchasing, fixed asset accounting, and payroll fall into the more conventional technology usages and narrowly focus on one specific functional area. The high technology users would have more than one category of technology, (e.g., CAS, CAD, CAM, robotics, lasers, overall systems and CAP) and, therefore, more breadth in technological sophistication. According to the Delphi Group, the greater than seven uses cutoff means that the high tech firms are adopting technologies in a wider range of functions.⁵

The results of the study confirm that the accounting function is the first area impacted by new technologies in smaller manufacturing firms. The accounting group (CAS) had the top five rankings in technologies followed by the CAM and SYS groups of characteristics, which included the sixth, seventh, and eighth most-used applications in technology (i.e., production scheduling, materials requirement planning, product tracking, and inventory ordering systems). See Table 1.

Inhibitors

Another variable of strategic importance is inhibitors to technology implementation. Respondents were asked to identify all factors which they consider barriers to technology usage. The top barriers (in rank order) are lack of capital investment funds, lack of staff to investigate new technology, satisfaction with present operations, lack of time to investigate new systems, and lack of knowledge of available technology. Amount of capitalization and availability of resources in small businesses are common strategic issues which have been linked empirically to the success or failure of a firm [1] [7] [22]. As Thompson [21] states in his research on cash flow management, "(The) vast majority of small firms are undercapitalized." The results of this study confirm previous research linking small size and the lack of capital investment funds. However, studies show that small capitalization companies have outperformed larger companies.⁶ Lyneis [10] found that smaller firms adopt short-term financing strategies regarding lines of credit, accruals and accounts payable to adjust for low capitalization. Weinstein [23] emphasized poor financial control as a major factor contributing to business failure, particularly in the areas of inventory, receivables, and payables.

Other inhibiting factors to technology, which were rated as moderate barriers, include lack of financial data, desire to avoid debt, and the lack of the technology's compatibility with existing resources. Using the Delphi Group methodology, inhibitors are also grouped into low (0-1), medium (2-6) and high (7-16) categories. The low group cutoff of 1 is made to

assess firms which have a relatively barrier-free environment. The medium group is characterized as the average. The cutoff point of 6 is suggested because firms in this group would experience a number of different barriers covering at least two types of environmental areas. The high inhibitor group would be differentiated from the low and medium groups with 7 or more obstacles because they would report barriers in more than two environmental areas (e.g., economic, political, financial, human resources).

TABLE 2
TECHNOLOGY OF FIRMS AND INHIBITORS

FREQ (COL %)	LOW TECH FIRMS (0-1)	MEDIUM TECH FIRMS (2-6)	HIGH TECH FIRMS (7-16)	TOTAL
LOW #	46	15	28	89
INH (0-1)	(82.1)	(36.6)	(59.6)	(61.9)
MED #	6	7	7	20
INH (2-6)	(10.7)	(17.1)	(14.9)	(13.2)
HIGH #	4	19	12	35
INH (7-16)	(7.1)	(46.3)	(25.5)	(24.9)
TOTAL	56 (100.0)	41 (100.0)	47 (100.0)	144 (100.0)

DEGREES OF FREEDOM = 8
CHI-SQUARE = 6.445
P ≤ .25

Table 2 indicates that low technology firms see fewer barriers to technology than do higher tech firms. Eighty-two percent perceive one or no barriers to the use of technology.

The responses of the medium and high technology firms, on the other hand, are bimodal. They identify either few or many inhibitors. In both cases, the firms use technology more extensively, and the executives envision more barriers to new technological implementation. Their view of barriers is more formidable, but perhaps more realistic, than those firms which are low technology users.

TABLE 3
PERFORMANCE FACTORS

Description	Overall Freq	Percent %	Sample Rank
Profit margin-O	41	29	1 (t)
Sales-O	40	28	2
ROI-O	36	25	3
Safety stock invy-T	32	22	4 (t)
WIP or finished goods invy-T	32	22	4 (t)
Market share-O	28	19	6
Rework costs-T	22	15	7 (t)
Scrap costs-T	22	15	7 (t)
Payroll costs-O	20	14	9
Accts receivable-O	8	6	10

NOTE:

T-Throughput performance variables

O-Output performance variables

t-Tie in ranking

Organizational Performance

Of the 10 financial performance factors studied in this research, profit margin is the top ranked factor, checked by 29 percent of the firms. The rankings are based on the number of firms which check factors with a 3 (above average) performance rating relative to the industry. Other performance factors which firms rated high in relative performance include sales, ROI, and control of inventory costs for safety stock, work in progress, and finished goods. In Table 3, frequency, percent and rank are given for each performance variable across the total firms sampled.

In this study the total number of performance indicators for which firms rated above average relative performance is calculated. Those with little or no (0-1) performance effects were classified as low performers, those with a few performance improvements (2-3) as medium performers, and firms with four or more performance indicators checked were classified as high performers.

The rationale for a cutoff point of one for the low group is similar to those for the inhibitor group, reflecting resource constraints and minimal indicators of success. The medium and high groups are distinguished at four since this points to a more significant number of improvements. The medium-performing firms could conceivably focus their superior performance in one of the two performance groupings. This would mean medium performers are not broad in the way they measure performance (i.e., output versus throughput). However, with the cutoff of four, the high-performing firms are more likely to evidence performance as multibased and inclusive of both output and throughput measures.

Results show a highly significant difference among the three groups of technology users based on performance. (See Table 4.) The group which has fewer improvements in performance is also the group which has little or no technology; the medium technology users have a moderate number of

TABLE 4
TECHNOLOGY OF FIRMS AND FINANCIAL PERFORMANCE

FREQ (COL %)	LOW TECH FIRMS (0-1)	MEDIUM TECH FIRMS (2-6)	HIGH TECH FIRMS (7-16)	TOTAL
LOW	50	10	4	64
PERF (0-1)	(89.3)	(24.4)	(9.3)	(44.4)
MED	2	5	5	12
PERF (2-3)	(3.6)	(12.2)	(10.6)	(8.4)
HIGH	4	26	38	68
PERF (4-10)	(7.1)	(63.4)	(90.1)	(47.2)
TOTAL	56 (100.0)	41 (100.0)	47 (100.0)	144 (100.0)

DEGREES OF FREEDOM = 8
CHI-SQUARE = 92.95
P ≤ .0001

performance enhancements. The firms experiencing the most positive financial performance changes are the high tech user firms.

This finding supports the focused work of Riggs and Bracker [16] which showed the linkage between computerized systems limited to forecasting and aggregate planning and performance. It appears that small businesses which have adapted to advanced technologies are reaping greater organizational performance gains than firms which are adapting more slowly or not at all. Schroeder et al. caution managers that adoption of technologies is not a panacea for solving small business problems. Critical management in terms of using the technologies for competitive advantage requires advance planning.

Affinity to Computerization

Since the most common use of technologies appeared in the Computerized Accounting System (CAS) group, a Pearson correlation test was performed on the CAS variable in relationship to the other technology categories. The results are summarized in Table 5 and confirm significant relationships between CAS and the remaining technology variables, with the strongest associations between CAS and the two groups of Computer-Assisted Manufacturing, CAM, ($r=.549$, $p \leq .0001$) and Overall Systems, SYS, ($r=.593$, $p \leq .0001$) technology. It seems likely that as firms adopt more technologies in the computerized accounting area, they are also increasing their use of technology in other functional areas such as production, management information systems, and new product development.

TABLE 5

CORRELATION OF COMPUTER ACCOUNTING SYSTEMS AND SPECIFIC TECHNOLOGIES

Description of Technologies	Correlation Coefficient	Significance Level
Robotics	.185	.026
Computer Assisted Design	.355	.001
Computer Ass'd. Mfg.	.549	.001
Computer Ass'd. Prod. Plan.	.321	.001
Lasers	.280	.001
Overall Systems	.593	.001

Strategic Implications and Conclusions

Performance Implications

The strategic implication this research has for manufacturing entrepreneurs is that production-based firms, which have already adapted new technologies, are experiencing increased sales growth, improved market share, and greater profitability as exhibited by higher return on investment and return on sales ratios.

With respect to performance, it appears that technologies such as robotization, manufacturing design, overall systems, and computerization of accounting contribute most to posi-

tive changes. Entrepreneurs would do well to consider adoption of these technologies, particularly the most popular CAS and CAM adaptations. The linkage of laser and CAP technologies to performance is more perplexing. Although technology in general is tied to performance, these two variables do not conform to performance enhancement theory. Further investigation of the reasons for these unexpected findings is needed. Questions such as the time lag for implementation of specific technologies and the relative costs need to be addressed. Perhaps laser and CAP technologies have longer-term positive impacts on performance that do not show up in this research, or there may be unspecified barriers to successful implementation of new laser and CAP technologies.

Strategic Implications—A Proactive Stance

In general, those firms which are slow to adapt to technologies will be faced with poorer financial performance relative to their competitors and thus placed at a competitive disadvantage. The reactive "If it ain't broke, don't fix it" mode with regard to usage of advanced technologies may be a very risky strategy in an increasingly competitive and rapidly changing environment. Davig [4] concurs in his research and states that small business leaders who "Wait and see, then react" will probably be left behind.

Results of this study must be interpreted with caution due to its exploratory nature, the limited geographical area surveyed, and the nature of self-report respondent ratings that are not independently verified. Nevertheless, the results do support suggestions of theorists who argue that strategies incorporating technological adaptations are influencing greater organizational effectiveness. O'Neill and Duker [14] reiterate this theme in their research and recommend new strategies that are based on the latest in technological advancement because small businesses can no longer depend on business practices that succeeded in the "good old days" for the turbulent environment which they are now facing.

Implications of Technology Inhibitors

This study shows that firms which have little or no technological adoption see very few barriers to technology usage. The managers of these firms seem more content with the present status of their firms, but also experience few positive changes in performance. These findings are contrasted to the firms which apply the new technologies more extensively. High technology users view a substantial number of barriers to technology (including time, money, knowledge, and staff constraints), yet these firms experience many indicators of successful financial performance from lowered costs of work in progress, finished goods and safety stock inventory, to increase in sales growth and profitability ratios. It seems that entrepreneurs who adapt new technologies are realistic about the problems that their small firms need to overcome; they make changes in their technologies to improve efficiency and profitability.

Additionally, this study provides evidence to government

and business policymakers, specifically those who influence financial institutions, that a lack of investment capital is a major barrier for small manufacturers to adopting new technology. Programs aimed at small businesses for capital investments in advanced technologies such as a small business investment fund similar to that of mortgage funds for first-time home buyers, or centers of innovation grants which fund small business projects involving technological adaptation, would seem to make sense both economically and financially.⁸

Small businesses are faced with a lack of resources, in terms of time, staff, and financial resources, to investigate new systems and to learn about technology that is available to them. Governmental and higher education policymakers can respond to this need and provide technological assistance through programs such as the Service Corps of Retired Executives (SCORE), the Small Business Administration (SBA), and Small Business Development Centers (SBDC), as well as regional or local conferences and seminars centered around new technologies (e.g., JIT, Expert Systems, CAD/CAM and MRP) for small business owners and entrepreneurs.

FOOTNOTES

¹A more detailed account of numerical control technology can be found in Matthew J. Liberatore and George J. Titus, "The Use of Computer Controlled Tools By Small Machine Shops," *Journal of Small Business Management* (January 1986), pp. 55-62, and "Machine Tools and Accessories" *U.S. Industrial Outlook 1985* Washington D.C.: U.S. Government Printing Office, pp. 20-28.

²The trend of small businesses in a "high-tech world" is described more fully by Douglas J. Lincoln and William B. Warburg [9].

³For further discussion of all six planning activities that were critical to small firms, see R.B. Robinson, Jr., M. Salem, J.E. Logan and J.A. Pearce, II, "Planning Activities Related to Independent Retail Firm Performance," *American Journal of Small Business* (Summer 1986), pp. 19-26.

⁴For an in-depth analysis of the Dess and Robinson [5] method of measuring financial performance, please see Sapienza *et al.* [18].

⁵In the article "Factory of the Future: A Survey," *The Economist*, May 30, 1987, p. 14, innovative firms were found to computerize their machine tools first, then to streamline their scheduling departments and lastly, to link the two departments together.

⁶See Hubert J. Dwyer and Richard Lynn, "Small Capitalization Companies: What Does Financial Analysis Tell Us About Them?" *The Financial Review*, 24 August 1989, pp. 397-415 for a discussion of the sources of superior performance by small capitalization companies. Also see [10] and [21].

⁷Recommendations from D.M. Schroeder, S.W. Congden and C. Gopinath [19] include planning the requirements of new technology adoption, matching the firm's strengths with the technology choice, and preparing contingency plans for implementation obstacles.

⁸Another solution to the problem of undercapitalization is the development of institutional venture capital groups such as 3i, formerly called Investors in Industry Group PLC, which was set up in the United Kingdom. See Meir Ramari's "Financing High Tech In Small Firms," *The Bankers Magazine*, March-April 1986, pp. 52-55 for more details.

REFERENCES

- [1] Boardman, D.M., J.W. Bartley, and R.L. Tarliff, "Small Business Growth Characteristics," *Management Accounting* 5, January-March 1981, pp. 33-43.
- [2] Burrows, Brian C., "Computer-Aided Design and Manufacturing - A Manager's Guide," *Long Range Planning*, October 1986, pp. 76-83.
- [3] "Can America Make It?: Rebuilding the U.S. Model," *Financial Times*, May 9, 1987, p. 26.
- [4] Davig, William, "Business Strategies In Smaller Manufacturing Firms," *Journal of Small Business*, January 1986, pp. 46-48.
- [5] Dess, G.G. and R.B. Robinson, "Measuring Organizational Performance In The Absence of Objective Measures: The Case Of The Privately Held Firm and Conglomerate Business Unit," *Strategic Management Journal* 5, 1984, pp. 265-273.
- [6] Dumaine, Brian, "How Managers Can Succeed Through Speed," *Fortune*, February 13, 1989, pp. 54-58.
- [7] Ibrahim, A. and J. Goodwin, "Perceived Causes of Success In Small Business," *American Journal of Small Business* 2, Fall 1986, pp. 46-53.
- [8] Kipp, H.O., "Ready for Robots?" *Dun and Bradstreet Reports*, July-August 1983, pp. 14-16.
- [9] Lincoln, Douglas, and William Warberg, "The Role of Microcomputers In Small Business Marketing," *Journal of Small Business Management*, April 1987, pp. 8-17.
- [10] Lyneis, J.L. "Designing Policies to Deal with Limited Financial Resources," *Financial Management*, Spring 1975, pp. 59-66.
- [11] Malone, Stewart, "Computerizing Small Business Information Systems," *Journal of Small Business Management*, April 1985, pp. 10-18.
- [12] Mitchell, R.H., "Robotics For Smaller Manufacturers: Myths and Realities," *Business Horizons*, July-August 1986, pp. 9-18.
- [13] Olson, Philip, D., "Entrepreneurs: Opportunistic Decision Makers," *Journal of Small Business Management*, July 1986, pp. 29-35.
- [14] O'Neill, Hugh M., and Jacob Duker, "Survival and Failure in Small Business," *Journal of Small Business Management*, January 1986, pp. 30-37.
- [15] Peters, Tom, *Thriving On Chaos: Handbook for a Management Revolution*. New York: Alfred A. Knopf, 1987.
- [16] Riggs, Walter E. and Jeffrey S. Bracker, "Operations Management and Financial Performance," *American Journal of Small Business*, Winter 1986, pp. 17-23.
- [17] Safizadeh, M. Hossien, F. Raafat, and C.H. Davis, "On The Implications of Information Processing Tools For Small Businesses," *International Journal of Management*, September 1986, pp. 73-80.
- [18] Sapienza, Harry J., Ken G. Smith, and Martin J. Gannon, "Using Subjective Evaluations of Organizational Performance in Small Business Research," *American Journal of Small Business*, Winter 1988, pp. 45-53.
- [19] Schroeder, D.M., S.W. Congden, and C. Gopinath, "New Technology and the Small Manufacturer," *Journal of Small Business Management*, Vol. 27 No. 3, July 1989, pp. 1-10.
- [20] Sullivan, Jeremiah J. and Gretchen O. Shively, "Expert System Software In Small Business Decision Making," *Journal of Small Business Management*, January 1989, pp. 26-32.
- [21] Thompson, Ray, "Understanding Cash Flow: A System Dynamics Analysis," *Journal of Small Business Management*, April 1988, pp. 23-30.
- [22] Van Auken, Howard E., "Acquisition of Capital By Small Business," *The Journal of Financial and Strategic Decisions* 2, Spring 1989, pp. 99-110.
- [23] Weinstein, H.N., "An Analysis of Business Failure and Financial Control Processes," *Journal of Accountancy*, December 1982, pp. 12-16.

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vulnerability in the late seventies, Khomeini's role as revolutionary symbol, and later as revolutionary leader, was certainly crucial.

Whereas in the 1963 uprising, university and high school students had been reluctant to join forces with men they regarded as religious reactionaries, such students did join forces with Khomeini and his more traditional supporters in 1978-79. One reason for this was that an Iranian intellectual named Ali Shari'ati, who had a Ph.D. from the Sorbonne, had disseminated a kind of Islamic "liberation theology" in the 1960s and early 1970s. In his writings, Shari'ati urged westernized Iranians to return to their true Islamic identity rather than mimic the West. He also argued that Islam, and Shi'i Islam in particular, was an inherently revolutionary ideology. Thus Iranian students had no need to turn to Marxism - which did in fact appeal to many Iranian students. This line of reasoning, which involved Marxist reinterpretations of Islam very similar to "liberation" Christianity in Latin America, led many students to repudiate "the western ideology of Marxism" and return to Islam - or at any rate to the ideologized Islam of Shari'ati (which was far removed from the popular religion of the peasants - who did not participate in Iran's revolution).

While many Iranian religious scholars (*ulama*) condemned Shari'ati's revolutionary interpretation of Islam, it played a pivotal role in the revolution that brought these same scholars to power. The students and other young intellectuals committed to Shari'ati's ideas saw Khomeini as the embodiment of their revolutionary Islam, while ignoring the more "fundamentalist" themes in the Ayatollah's writings. Many of these young people were later "devoured" by the revolution they helped bring about.

Together, Khomeini and Shari'ati provided the Iranian revolution with its ideology. Khomeini also provided it with leadership. The revolution was not simply the result of a carefully planned plot hatched by the Ayatollah and his cronies. The Iranian revolution, like all revolutions, was due to un-

planned discontents and crises as well as planned attempts to exploit them.

Khomeini, who remained in Iraq during most of the revolution, appears to have been as surprised by the upheaval of 1978-79, at least initially, as Lenin was by the February revolution of 1917. Khomeini did not plan Carter's human rights policy or the Shah's relative liberalization (not to mention the Shah's cancer). Nor did he plan the "public letters" of the secular intellectuals in 1977. Nor did he plan the publication in January 1978 of an inflammatory article vilifying him as a sexual deviant employed by the British. The Shah's own Minister of Information ordered the publication of this article, which sparked the cycle of protest, martyrdom, and mourning that eventually coalesced into the revolution. Nor did Khomeini plan his expulsion from Iraq and flight to France in October of 1978, which enabled him to communicate with Iran and the world more effectively than he ever had before. This was the Shah's idea. Khomeini's role as a leader was unquestionably of major importance by the late summer of 1978, when his refusal to compromise with the Shah entailed the latter's downfall. But in the revolution's embryonic stages, he was most important as a multifaceted symbol around which the various strands of the opposition could rally.

In short then, to view Iran's Islamic revolution as merely a reactionary response to the Shah's overly rapid modernization is mistaken. While there was a reactionary dimension to Khomeini's "fundamentalism," there was also a clearly nationalistic dimension to the Iranian revolution that the American mass media have tended to ignore. Nationalistic resentment of foreign influence in Iran did not suddenly emerge in 1978-79, nor was such resentment a uniquely Iranian phenomenon. Iranian perceptions of the Carter human rights policy and the Shah's relative liberalization in 1977 encouraged Iranians to articulate this resentment, as well as resentment of the Shah's repressive regime and other grievances. Khomeini, by virtue of his religious authority as well as his own personal charisma, came to symbolize these grievances and eventually took control of the popular protests that brought down the Shah.

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him a "world war," and which he spent the better part of his adult life observing. At the beginning of the war, Athenian democracy is flourishing, Athens enjoys unparalleled hegemony in the Greek world. A quarter century later, the regime has collapsed, the empire lies in ruins.

The political problems that democracies face trying to preserve their ideals and institutions in a world hostile to both are elaborated by Thucydides with unsurpassed lucidity. Are we today interested in problems of democratic leadership? Of reconciling the self-interest of individual citizens and the public interest? Are we concerned with the intricacies of relations between domestic structure and foreign policy? How democracies can successfully retain the concepts of political

legitimacy on which they are based, and at the same time garner and maintain the will to act assertively in the international arena? In short, do we wish to understand how democracies perish? Such questions, unfortunately, are not academic for us. And Thucydides' narrative provides classic answers.

This essay leaves to others, however, the task of applying the universal political lessons of Thucydides to the particular political crises of the day. Throughout, I aspire to emulate Thucydides by entering into his heart no further than the text itself evidently guides me; to follow where compulsion leads, not where honor or interest may suggest; in the words of Thomas Hobbes, to let the narration itself secretly instruct the reader, and more effectually than can possibly be done by precept.



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