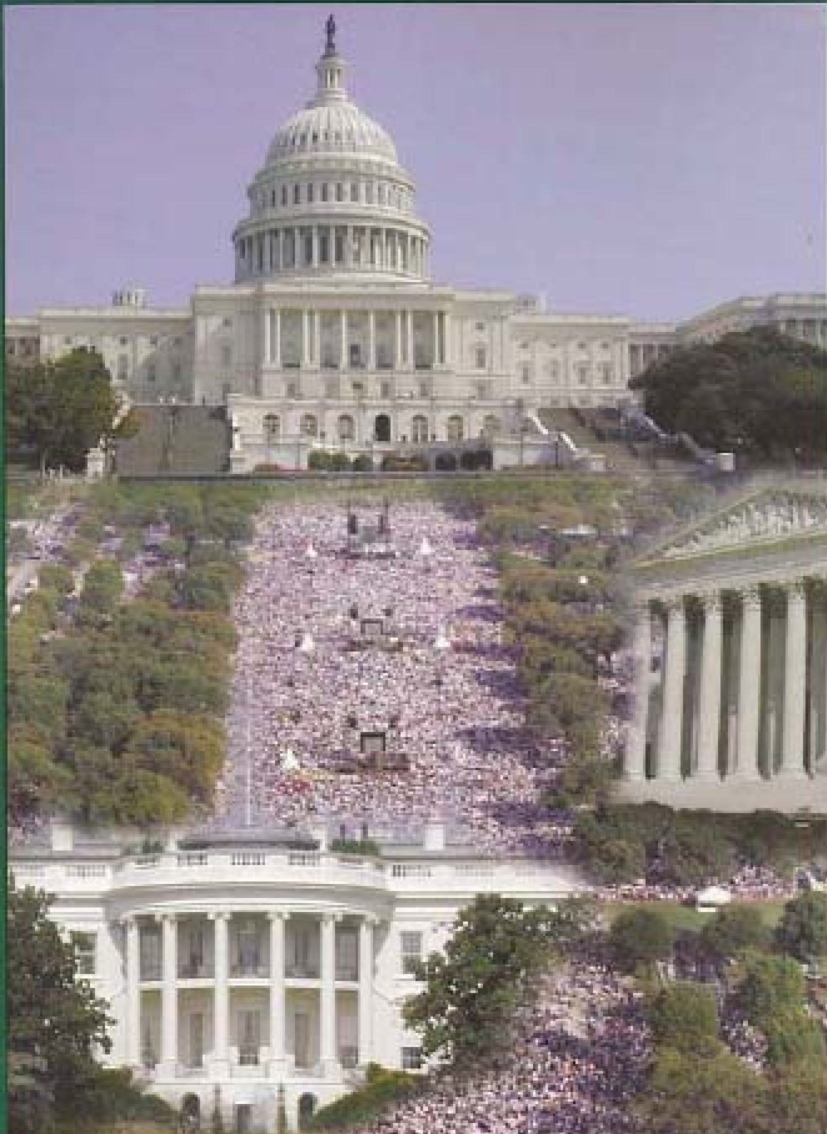
Celebrating 20 Years



FOSTERING HUMAN PROGRESS:
Social and Behavioral Science Research Contributions to Public Policy

Consortium of Social Science Associations

October 2001

Cover photos:

Capitol, White House, Supreme Court: Photos by Chris Ryan, COSSA
Crowd on the National Mall: © 1997, the Washington Post. Photo by Susan Biddle. Reprinted with permission.

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PREFACE

The following report was written, compiled, and edited by Howard J. Silver, COSSA Executive Director, and Wil Lepkowski, science policy journalist. We had enormous help from many people.

First, I want to express my deep appreciation to the COSSA Executive Committee, chaired by Carl Monk of the Association of American Law Schools, who encouraged the preparation of this document as part of COSSA's 20th Anniversary celebration. I thank them for their help and support. I also want to thank Catherine Rudder, former Executive Director of the American Political Science Association, and Margaret Reynolds, Executive Director of the Linguistic Society of America, who chaired and served, respectively, on the 20th Anniversary Committee.

COSSA's Executive Director,Howard Silver.

I also want to thank COSSA's Members, Affiliates, and Contributors, without whose support the Consortium could not carry on its important work. These professional associations, scientific societies, universities, and research institutes are listed in the back pages.

In putting the report together, social and behavioral scientists organized by COSSA's Members provided preliminary papers on topics covered by the chapters. Other social and behavioral scientists and government officials pointed to valuable source materials and provided overviews of their own. Still others reviewed drafts of the chapters. They are acknowledged in the endnotes. I also wish to thank Kenneth Prewitt, former Census Director and now Dean of Graduate Studies at the New School University, who played a paramount role in COSSA's founding and who reviewed the entire draft document.

The COSSA staff - Angela Sharpe, Chris Ryan, and John Wertman - also provided considerable help. They conducted interviews of government officials, helped write and review chapters, and aided in the production of the final document. They also helped the Executive Director by increasing their workload while he worked on the report.

As COSSA enters its third decade, we continue to promote the importance of the social and behavioral sciences to our national endeavors and to individual and societal well-being. The achievements of the social and behavioral sciences during the past 20 years have been significant. The future will bring further noteworthy contributions that will continue to foster human progress.

This report is dedicated to human beings, whose fascinating behavior remains the key subject of research conducted by social and behavioral scientists.

Howard J. Silver
Washington, DC

October 2001

1. INTRODUCTION

Today, at the outset of the 21st century, the social and behavioral sciences stand at the threshold of new and exciting opportunities. The technologies spawned by the physical and biological sciences have presented society with such a lengthening array of human problems that policy leaders have nowhere else to turn if they have any hope of understanding them, let alone dealing with them.

Technological change, however, is far from the sole reason for the enthusiasm. Social change itself, from growing racial and cultural diversity in societies to the challenges brought by the war on terrorism, is calling on the best tools, techniques, and minds in the social and behavioral sciences as never before.

National Science Foundation (NSF) director Rita Colwell recently declared the 21st Century as the century for the social and behavioral sciences. The late George Brown, former Chairman of the House of Representatives Science Committee, noted in 1994 that the country's most serious problems were social, "for which there are no technical solutions, only human solutions. More work in the social sciences is not a luxury but a requirement," he continued. "Enhanced social science knowledge is required for insight and perspective on the accumulated social problems that have eroded American society."

This report examines some of the ways in which the social and behavioral sciences are contributing to the improvement of American society. Those contributions are not always noticed because, as one researcher has observed, they often come in "ripples, not waves" and are often taken for granted by legislators and policymakers who use them to make choices about competing demands for scarce resources. These choices—whether in criminal justice, environmental regulation, or economic policy—are made possible by the continued presence of social and behavioral scientists in the Executive and Legislative branches of government, and as witnesses before congressional and regulatory bodies.

This report covers six societal goals: Creating a Safer World, Increasing Prosperity, Improving Health, Educating the Nation, Promoting Fairness, and Protecting the Environment. All are consistent with Congressman Brown's admonition "to enlist science and technology in a campaign for a more productive and humane society." They were derived from the list compiled by the Brookings Institution in its report, *Government's Greatest Achievements of the Past Half Century*. Within the six goals are many issues of public policy where social and behavioral science research has affected choices. These include: international affairs and national security, crime and criminal justice, economic growth, poverty, retirement, disease prevention, cancer and smoking, HIV/AIDS, early childhood, learning and teaching, school choice, student aid, civil rights and anti-discrimination, and environmental regulation and global change.

Clearly, the report provides only brief summaries of research across a vast territory of social and behavioral inquiry. There are other areas of the research agenda that are omitted, not from any prejudice, but to provide some boundaries. Even within the six goals, the report highlights only a small portion of the studies that fill the social and behavioral sciences' research portfolio. Researchers are studying such a myriad of topics concerning individual and societal activities that it is difficult to describe them all. We have tried to focus on some that we deemed significant.

The social and behavioral sciences are usually seen as a poor stepchild in America's science policy. Ignored by Vannevar Bush in his landmark report for President Franklin D. Roosevelt, *Science: The Endless Frontier,* and left out of the National Science Foundation's programmatic menu in its early years, they gradually gained credence and credibility over the latter part of the twentieth century. The Great Society proclaimed by President Lyndon Johnson in the 1960s gave impetus to a "golden age" of social and behavioral studies in that decade and the early 1970s. The massive increase in government programs across the domestic agenda in both the Johnson and Nixon administrations led to alterations in the nation's science policy; the social and behavioral sciences benefited from the need for evaluations of new programs and the desire to complete the unfinished agenda of the New and Fair Deals. The National Science Foundation even created a program called Research According to National Needs (RANN).

With the economic troubles and the national malaise of the late 1970s, a backlash grew against the Great Society and, concomitantly, against the social and behavioral sciences, which were seen as the intellectual underpinning for those programs. Members of Congress found it to their political advantage to ridicule social science grantees as a "… foolish, fringe folly of researchers who use our tax money like the dilettante squanders his inheritance – recklessly and with little meaning or value except to pander to their own snobbish tastes." This attitude toward the social and behavioral sciences reached a crest in 1981 when President Ronald Reagan's first budget threatened cuts of up to 75 percent in NSF's social and behavioral science budget and attacked research in these disciplines supported by other government agencies.

The Birth of COSSA

Alarmed about these attacks, the ten major disciplinary associations in the social and behavioral sciences began organizing a coordinated response. With strong support from the Social Science Research Council (SSRC) and from major universities, the Consortium of Social Science Associations (COSSA) was launched in May 1981. Recruited from the SSRC staff, historian Roberta Balstad Miller became COSSA's first director and led the defense of these sciences against the political onslaught. The first year's efforts saw some success in mitigating the budget cuts, and COSSA incorporated in 1982. Additional professional societies were invited to join as Affiliates, and universities and research institutes as Contributors.

By then COSSA had moved beyond the defense of NSF's social sciences budget to monitor all federal agencies that provided support for these fields. A biweekly newsletter, the *COSSA Washington UPDATE,* became the Consortium's information tool for the community. In order to fulfill its mission as a bridge between the academic research community and the Washington policymaking world, COSSA began to present briefings on Capitol Hill, where social and behavioral scientists would present their research results on relevant policy issues. Recently the Ford and W.K. Kellogg Foundations have provided support for these briefings. The tradition of an annual meeting also took root, giving COSSA's Members, Affiliates and Contributors the opportunity to hear directly from Washington's policymakers.

In the 20 years since COSSA's founding, it has grown, prospered, and taken its place as a key participant in Washington's science advocacy community. Executive Director Roberta Miller left in 1984 and was replaced by psychologist David Jenness. In 1988, political scientist Howard Silver became COSSA's third Executive Director. The staff grew and provided a place for social and behavioral scientists to gain advocacy and political experience. Former staff members have moved on to important policy positions. The Members category increased as interdisciplinary groups joined the original ten. The Affiliates and Contributors categories expanded substantially as more groups and universities decided it was important to support a group dedicated to enhancing the status of the social and behavioral sciences. COSSA now numbers over 105 Members, Affiliates, and Contributors.

COSSA moves out of the Brookings Annex, 1984. Pictured left to right: Howard Silver, Susan Quarles, Executive Director Roberta Miller. Eileen Chotiner.

Accomplishments

As the following pages attest, the social and behavioral sciences have risen from the nadir of 1981. Although budgets grew only gradually during the rest of the 1980s, the attacks, for the most part, stopped. By the end of the decade the late Herbert Simon, Nobel Prize winner in economics, and others were asserting that the social and behavioral sciences deserved increased recognition. They began pressing for a separate directorate for these disciplines at the National Science Foundation.

Until then, these disciplines had been part of what was called the Biological, Behavioral, and Social Sciences directorate that was routinely led by individuals trained in biology. Under a campaign led by COSSA, Simon's call became a reality within two years. Sociologist Cora Marrett served as the first head of the new Social, Behavioral, and Economic Sciences Directorate (SBE) and was succeeded by psychologist Bennett Bertenthal. Social psychologist and former University of Chicago Provost Norman Bradburn now leads it. The SBE has become another important symbol of the arrival of these sciences as equal partners in the nation's scientific enterprise.

At about the same time as the creation of the SBE directorate, COSSA convinced then-Presidential science adviser Allan Bromley that the White House Office of Science and Technology Policy needed an Assistant Director for the Social and Behavioral Sciences. Bromley, who had been President of the American Association for the Advancement of Science in 1981 and had spoken out against the Reagan Administration cuts, agreed to create the position. Political scientist Pierre Perrolle, now Director of NSF's International Division, was the first occupant of this role. Psychologist James Griffin, an educational researcher, currently holds the position.

While all this was occurring, recognition of the importance of the social and behavioral sciences in the health policy arena was also growing. An Institute of Medicine report noted the relationship of behavioral and social factors to the leading causes of death. COSSA and its allies convinced the Congress in 1993 that the National Institutes of Health (NIH) needed a behavioral and social science office to coordinate a research agenda to examine that relationship. The Office of Behavioral and Social Science Research (OBSSR), established in 1995, is playing a significant role infusing the rest of NIH with the idea that health research includes behavioral and social factors that impact individual and societal well-being. Psychologist Norman Anderson and now physician and health economist Raynard Kington have given the office distinguished leadership.

Despite these advances, in 1995 then House of Representatives Science Committee chairman Robert Walker decided that it was time to challenge the social and behavioral sciences again. He led an attempt to abolish the SBE directorate at NSF. With strong support from the NSF leadership, particularly Director Neal Lane and Deputy Director

Anne Peterson, along with groups across all the sciences, COSSA led a successful effort to thwart Walker's intentions. The directorate survived. Walker left Congress in 1996.

The Future

As COSSA enters the new millennium and its third decade, it will continue to keep a protective watch over the social and behavioral sciences. The future holds great promise for these disciplines. New tools such as neuroimaging, geographic information systems, controlled laboratory experiments, data mining techniques, more longitudinal data collections, digital libraries, virtual consortia, combined with enhanced computational power, will provide better information leading to new understanding of human and societal behavior. The social, economic, political, and cultural consequences of the great advances in information technology, nanotechnology, biotechnology, and other technological variants will undoubtedly grow as a fundamental part of these sciences' research agendas. For we will still need to learn how, in a technologically driven era where human interactions will continue to dominate, individuals and society will function and thrive. As a consequence the social and behavioral sciences will continue to thrive as well.

2. CREATING A SAFER WORLD: INTERNATIONAL AFFAIRS

While often unnoticed by policymakers and the general public alike, the work of social and behavioral scientists has been critical in nearly every area of international relations. Research by scholars has shaped the conduct of foreign policy, both in the United States and around the world. In this new and uncertain era, the knowledge and insights gained from these sciences will be even more vital in promoting collective security and international understanding as the U.S. government and its allies push off into the uncharted waters of taking on well-funded and highly organized global terrorist networks.

Past contributions of social scientists that have shaped foreign policy making are numerous. President Woodrow Wilson, who was also President of the American Political Science Association, wanted "to make the world safe for democracy." Sovietologist George Kennan wrote the famous "Mr. X" article that became the basis for our policy of containment against Communism. Hans Morgenthau of the University of Chicago and Kenneth Waltz of the University of California at Berkeley provided "realist" theories of international relations that were put into practice by political scientist Henry Kissinger in his service as Secretary of State and National Security Adviser during the 1970s.

Source: White House Photo

Former Secretary of State Henry Kissinger.

Source: White House Photo

Current National Security Advisor Condoleezza Rice.

During the Cold War, social scientists focused on nuclear deterrence as the key strategy in foreign policy formulation, and on the nation-state as the major actor in international politics. In the post-Cold War era, strategies have shifted markedly. U.S. officials can no longer rely on the relative predictability of the potential outcomes of the government's actions in light of the interests of one major opponent, the Soviet Union. Today, the United States has a redefined role as the world's dominant power in a much more fractured and unstable international arena. While traditional alliance politics and potential threats from emerging regional powers still play a large part in determining the tone and substance of foreign policy, the events of September 11, 2001 demonstrate the unpredictable dangers our leaders face in an interdependent world connected through trade, communications, and finance. Our diplomats and officials must utilize the extensive amounts of information collected by experts from a variety of fields.

There have been previous attempts to examine the vast new realities that Americans discovered with horrified shock on September 11. Writing in 1993, political scientist Samuel Huntington of Harvard pronounced that the fundamental source of conflict in the post-communist world will not be primarily ideological or economic, but cultural. Although Huntington notes that nation-states will remain the most powerful actors in world affairs, the "clash of civilizations" will draw the battle lines of the future. In addition, Graham Allison of Harvard and his colleagues produced a major study on the threat of nuclear terrorism that served as the basis for Senate Foreign Relations Committee hearings on the threat and helped shape legislation sponsored by Senators Sam Nunn, Richard Lugar, and Pete Domenici to meet this danger.

People

The social sciences probably make their most significant contribution to U.S. foreign policy through the direct service of scholars appointed or elected to high-ranking positions in the federal government. Some of the key social scientists to serve in top government posts in the past twenty-five years include former Secretary of State Henry Kissinger, National Security Advisors Condoleezza Rice, Anthony Lake, and Zbigniew Brzezinski, former Secretary of State Madeline Albright, former Defense Secretary Les Aspin, former United Nations ambassadors Jeanne Kirkpatrick and

Senator Daniel Patrick Moynihan. Through their daily interactions with the presidents they served, these individuals have brought their academic backgrounds to the front lines of U.S. foreign policy decision-making. Many social scientists have also served on the staffs in agencies of the intelligence community.

In addition to the service of these well-known figures, the federal government relies daily on experts working essentially anonymously throughout the Executive Branch. These individuals conduct studies that have far-reaching effects on short-term and long-range American strategies. They use their expertise to inform leaders about political and economic events throughout the world. They also provide important information about the cultures of foreign lands.

Conflict Resolution and Preventive Diplomacy

As the geopolitical environment has changed in the post-Cold War era, policymakers have been confronted with the need to acquire new knowledge on preventing or ending conflicts that take the form of terrorism and violent eruptions within regions with historical animosities. As Robert Putnam of Harvard has noted, Presidents and their foreign policy advisors must focus simultaneously on both external and domestic audiences. Since Vietnam, the domestic audience has often been more important. Thus, decisions about dispatching U.S. troops as peacemakers, getting involved in negotiations, issuing threats of force or economic sanctions, and, now, building a security state within our own borders without eroding civil liberties, are made with these constraints in mind.

In analyzing various strategies for dealing with conflicts throughout the world, experts have arrived at several key conclusions. The first of these is that threats of force by a major power must be credible to be effective. This reality seems to have influenced military operations in Grenada, Panama, and Iraq. When President Clinton set limitations on the use of U.S. military force or when the NATO allies were bickering among themselves, Yugoslav President Slobodan Milosevic ignored Western threats in response to his actions in Bosnia and Kosovo, not believing such threats to be credible. Even when presidents send troops into action, they often feel a need to set deadlines for their return home.

The second conclusion is that economic sanctions have a mixed record of success. In many cases, economic sanctions have hurt the oppressed people of a "rogue" state much more than the authority of the leader they are designed to weaken. The people of Iraq, for example, have suffered much more than Saddam Hussein from the sanctions of the last decade, suggesting more research must be done to explore how to undermine the power of potentially dangerous dictators.

The third conclusion by social scientists in regard to international conflict resolution is that providing positive incentives or rewards to foreign leaders in return for reforming destructive or destabilizing behavior, alternating with threats of force, may be the most effective means of preventing conflict. This tactic, termed "carrots and sticks" in international affairs theory, has been effective in several situations in recent years. President Clinton employed the approach in his dealings with the North Koreans. There is little doubt that U.S officials will continue to employ this "carrots and sticks" method well into the 21st century, especially when negotiating with states that harbor terrorists and serve as staging areas for their activities.

Another aspect of preventive diplomacy is the development of early warning systems, or the gathering and processing of information that alert nations to prospective crises. Stanford's Alexander George and the Carnegie Commission on Preventing Deadly Conflict have identified this as a significant contribution that provides decision makers with an opportunity to avert the crisis, modify it, or redirect it in some less dangerous and less costly direction. In a paper prepared for the Commission, George bemoans the situation in which early warning indicators are readily available but governments do not act. The failure to respond promptly to incipient crises has led many observers to note "missed opportunities," for example in Rwanda, where Western governments failed to prevent the murder of hundreds of thousands of Tutsis by their Hutu neighbors. Bruce Jentleson of Duke, under the auspices of the Carnegie Commission, led an effort to identify such situations, as well as regions where preventive action actually worked, such as the Baltic states.

Researchers and policy makers have also recognized that government-to-government, or "Track One," diplomacy is not often the best way to prevent deadly conflict. The use of private citizens or transnational organizations, dubbed "Track Two" diplomacy by political psychologist Joseph Montville and promulgated by former

Ambassador John McDonald, has become a significant factor in international politics. This tactic has been utilized throughout history, from the role of Citizen Genet in the 1790s to journalist John Scali's back channels during the Cuban Missile crisis. The diplomatic efforts of former President Jimmy Carter in Africa, Haiti, and North Korea, and of former Senator George Mitchell in Northern Ireland and the Middle East, are more contemporary examples.

Social scientists have long collected and systematized data that are used as instruments in the practice and evolution of foreign policy, particularly in trying to predict the likelihood of war in a given situation. One of the most significant examples of this type of quantitative research has been the militarized dispute data set from the Correlates of War project, coordinated by J. David Singer. The set contains information on over 2,000 disputes from 1816-1992. The project also has data on alliances, material capabilities, diplomatic recognition, international organizations and their membership, inter- and intra-state conflict, regime type, changes of government, cultural composition of states, and several forms of rebellion. A new NSF grant provides the support that will allow the updating of the dispute data through 2001.

Democratic Peace Theory and Democratization

For many political scientists, future global stability rests with U.S. efforts towards democratization around the world. The democratic peace theory, originally posited by Immanuel Kant and elaborated and modified by Michael Doyle of Princeton and others, posits that two democratic nations are unlikely to go to war against each other, for a variety of different reasons, including public accountability and transparency of interests and intentions. Western policymakers have embraced this theory, applying it specifically to promote (and succeed in) expanding the NATO alliance into the newly democratic former Eastern Bloc nations to ensure greater stability in that region of the world.

At the same time, policymakers have pointedly observed that many of these transitions to democracy involve constant struggle, with Russia as the prime example. In addition, research, primarily conducted by Edward Mansfield of the University of Pennsylvania and Jack Snyder of Columbia, has suggested that states making the transition to democracy are in greater danger of going to war than either mature democracies or autocracies. The National Science Foundation has supported studies on democratization, regime transitions, and citizen support for emerging democracies over the last eight years. Work by James Gibson of Washington University, St. Louis, Donna Bahry of Vanderbilt, and Brian Silver of Michigan State on the struggles in Russia, and Gibson's studies on South Africa are examples of this research. In addition, social scientists have directly helped in the day-to-day process of democratization, serving as consultants on political and legal reforms.

Along with changes in nations' political structures, the triumph of market capitalism and the liberalization of trade have led to the opening of free markets the world over. Economists have played central roles in framing and implementing the North American Free Trade Agreement, in providing input into the continuing debates over trade with China, in helping other nations form free-trade areas, and in facilitating former socialist nations in their transition towards capitalism. An emerging area of interest is the growing opposition to the globalization policies of the industrialized countries, manifested in the mass demonstrations at the meetings of the major global financial institutions in Seattle, Washington, D.C., and Genoa.

The Role of Transnational Organizations

In the 1970s, scholars such as Robert Keohane of Duke and Joseph Nye of Harvard recognized the importance of transnational organizations to foreign policy and international relations. Their early work has been carried on through the 1990s by social scientists Stephen Krasner of Stanford, Peter Katzenstein and Mathew Evangelista of Cornell, and many others. These scholars posit that nation-states, while important, are not the only actors in this realm of policy. The United Nations and the World Trade Organization, regional organizations such as the European Union, financial institutions like the World Bank and the International Monetary Fund, multinational corporations, social movements such as global sustainability, and non-governmental organizations (NGOs), all have impacts on various aspects of international affairs.

The promise and limitations of the United Nations has been a subject for numerous studies by social scientists. The experiment of the European Union as an attempt to politically unify a continent and its effect on the sovereignty of the nation-state provides another natural laboratory to test hypotheses on the role of supra-national organizations versus nationalism.

NGOs, in particular, have deep knowledge of regional and local issues, cultures, and relationships, and can often function in adverse circumstances even, or perhaps especially, where governments cannot. These groups, as the Carnegie Commission on Preventing Deadly Conflict has noted, help open the way to more formal internal or international peace processes. They also can provide early warnings of rising local tension. Social scientists have focused scholarly attention on the roles of these organizations in international activity.

Researchers have also examined social movements and collective action with regard to global economic and political transformations. They have studied how these movements are facilitated by conditions and context; how they spread; and how they recruit, gain resources, mobilize, and bring about social change. Sociologist Charles Tilly of Columbia University has examined the relationships among large-scale social change, the politics of conflicts, and the outcomes of social movements for democracy. Others, such as Saskia Sassen of the University of Chicago, have focused on the processes and conditions that lead citizens to participate in the growing number of transnational movements in response to what is perceived as the lack of democracy in supranational organizations such as the World Bank.

The darker side of transnational relations and non-state actors was starkly illustrated in September 2001 with the attacks on the World Trade Center and the Pentagon. These acts of terrorism and others like it demonstrate the power that a small group of actors can have on impacting the conduct of foreign policy and the course of world events. Such threats often require research and studies conducted out of the public eye.

Covert Studies

A significant amount of social science research relating to international affairs takes place behind the scenes, where it is conducted and used by the government agencies that most value secrecy in their operations: the National Security Council, the Departments of State and Defense, and the Central Intelligence Agency (CIA). Decision makers in these agencies rely heavily on expert studies as they attempt to navigate the uncertainties of global politics. Some experts are called upon to shed light on the causes and forces behind international conflicts, often to provide risk analyses to forecast the political and economic stability of various nations and regions. Randolph Siverson of the University of California, Davis, has discussed a forecasting tool called FACTIONS that the CIA employed to project change in the Soviet Union and elsewhere. This tool, developed by Stanford's Bruno de Mesquita, greatly depended on underlying social science models.

Behavioral scientists working for these agencies have provided psychological profiles of foreign government officials for use in summit conferences and for handling seemingly irrational leaders. Political psychologist Jerrold Post of George Washington University, formerly of the CIA's Center for Analysis of Personality and Political Behavior, has conducted profiles of numerous leaders including Saddam Hussein. These studies supplement the work of scholars like Columbia University's Robert Jervis, who have studied the effects of perceptions and misperceptions by decision makers on the conduct of foreign policy.

The Future

It appears that at least for the foreseeable future counterterrorism will be the organizing principle of American foreign policy. What will this mean? Can scholars examine the usual subjects such as alliances, coalition building, democratization, and the role of NATO and other such institutions? Is President Bush's admonition that you are either with the U.S. or against it viable in U.S. foreign relations? How will we treat Russia and China? Will U.S. Middle East policy change? How do we overcome the psychological hatred of the U.S. by certain groups? How will bringing the war "home to America" impact domestic support for foreign policy adventures? Can the immediate "rally round the flag" atmosphere be sustained? Will terrorism's economic repercussions lead to the end of liberal trade and immigration policies? Social and behavioral scientists will have much to investigate in the next few years.

3. CREATING A SAFER WORLD: REDUCING CRIME

The toll of crime can be counted in many ways – costs to society, and personal, interpersonal, and community impact. Although crime rates have dropped over the last ten years in the United States, our rates of violence, particularly homicide, remain high compared to other industrialized nations. Meanwhile, some particularly shocking crimes, such as the Oklahoma City bombing and the murder of schoolchildren by their classmates, have captured the attention of the nation.

Social and behavioral science research collects data and information on crime, examines the causes and consequences of crime and criminal behavior, and evaluates what works in the prevention and diminution of crime. Crime and criminal justice policy, however, is often driven by passion and ideology. Fortunately, many practitioners at the state and local level are learning from and using the research of the past 20 years.

In the early 1970s, society's efforts to control crime were guided by intuition and tradition. Attempts to measure crime ran into the lack of commitment by police departments to provide accurate and complete information. Theories of criminal behavior abounded, but meaningful tests of their usefulness were relatively rare. Since then, however, social and behavioral science research has led to significant changes in crime prevention and crime fighting.

During the 1970s and 1980s, the National Academy of Sciences' Committee on Law and Justice (CLJ), under the direction of Alfred Blumstein of Carnegie Mellon University, organized panels for research on deterrence and incapacitation, rehabilitation, sentencing, criminal careers, and other topics that fundamentally changed the approach to studying and understanding crime and its control. The two-volume *Criminal Careers and "Criminal Careers"* focused attention on the demographics of crime commission. In the early 1990s the committee published a comprehensive volume on *Understanding and Preventing Violence.* More recently, the panel has studied pathological gambling, drug control, juvenile justice, violence against women, and firearms, and strengthened our knowledge in these areas.

In addition, for the past five years, the National Science Foundation has supported a National Consortium on Violence Research (NCOVR) that has further researched factors contributing to crimes of violence and how to prevent them. Furthermore, the development of computer-based information systems, including crime mapping through the use of geographic information systems, have greatly enriched our knowledge of crime and led to useful approaches for crime prevention and detection.

What Works?

In the last twenty-five years, largely as a result of federal funding of evaluation research, the increased sophistication of that research, and the recognition of the role of theory in effective program evaluation, efforts to prevent and control crime have improved. In the early 1970s Robert Martinson declared, "nothing works." This followed a careful review of over three hundred studies of the effectiveness of correctional treatment programs. A later review of this and other work by the National Academy of Sciences' Committee on Law and Justice essentially confirmed Martinson's conclusion. There was still much to be done to advance criminal justice evaluation efforts. Throughout the 1980s and 1990s program evaluation took center stage and criminal justice agencies became more receptive to researchers and the use of research results.

In 1997, *Preventing Crime: What Works, What Doesn't and What is Promising,* produced by the Department of Criminology and Criminal Justice at the University of Maryland under a National Institute of Justice grant, provided the most comprehensive analysis of this literature and further emphasized the way rigorous theory-driven evaluations could improve efforts to prevent and control crime. The report evaluated previous research that focused on crime prevention in seven institutional settings: communities, families, schools, labor markets, places, police, and criminal justice. Programs that worked included: after-school recreation, comprehensive instruction for youth in social competency skills, vocational programs for older male ex-offenders, concentration of police in "hot spots," increasing police-citizen contact, especially aimed at increasing police legitimacy, removing guns from public places, and incapacitating offenders who continue to commit crimes at high rates. Some programs identified as not working, such as DARE (Drug Abuse Reduction through Education) and boot camps continue for reasons unrelated to their known efficacy. Still, there is gradual movement towards rigorous evidence as the basis for crime prevention and control instead of intuition and experience alone.

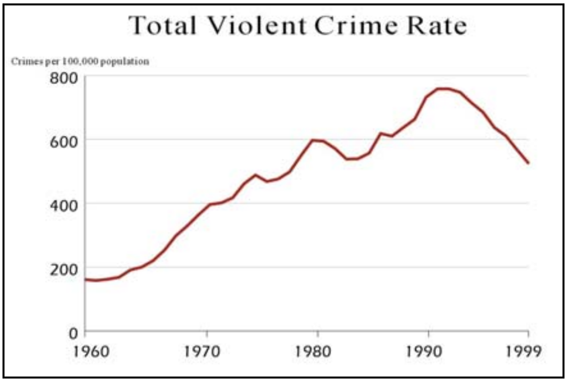
Measuring Crime

While still in their infancy compared to health and economic statistical series, the data on crime and justice have dramatically improved in the last 25 years. This period saw the establishment of national data collection series on prisons and prisoners, courts, police agencies, prosecution, and federal criminal law enforcement. Also, criminal justice institutions at both the federal and state levels have greatly improved their management and data collection systems over the past three decades, and have increasingly made these available for public use on the internet. These data systems provide a rich array of information on the characteristics of our criminal justice agencies and the cases processed in them. Even more important have been improvements in measuring crime.

Prior to 1975, knowledge about the extent and distribution of crime came largely from data voluntarily submitted to the FBI by local police departments published annually as the Uniform Crime Reports. This report purported to tell us how many crimes police knew about (murder, rape, aggravated assault, robbery, burglary, larceny, and auto theft) and how many arrests police recorded. While everyone knew these data undercounted crime (because not all crimes are reported, the reporting rules caused undercounts, and police agencies might sometimes purposely undercount crime) they were all that were available. During the past ten years, with significant input from criminologists, a new form of police data reporting, incident-based crime reporting, has been proposed and implementation has begun. In this system police provide more detailed descriptions of every criminal incident they encounter. While still in its early stages and not ready to replace other sources of crime measurement, this approach will eventually greatly increase the ability to develop more effective police responses and prevention efforts.

After years of preliminary work, the federal government launched the National Crime Victimization Survey in 1972 to measure crime by asking respondents in a carefully developed panel design to report on their experiences as victims. Through improvements over the last 25 years, this series and special supplements to it have greatly advanced our understanding of the distribution and correlates of criminal victimization. These data have contributed to a safer society by making policymakers more aware of the correlates of crime and by prompting the development of victimization theories such as routine activities theory. The data have also contributed to the recognition that victims have not received the same attention as offenders, thus providing

Rising steadily since about 1960, the crime rate dropped sharply through the 1990s.



Source: Justice Research and Statistics Association

support for victimization services and expansion of victim involvement in the legal process. Social and behavioral scientists had an important role in developing the methods for this data series, using the data to address victimization issues and suggesting ways the series could be enhanced.

Understanding The Causes Of Criminal Behavior

The social and behavioral sciences' most important contribution to a safer society will most likely result from the increased ability to predict and explain the onset and persistence of criminal behavior. The major developments of the last 25 years have been the recognition of the changing nature of criminal behavior over the course of one's life, the resulting need for multiple theoretical perspectives to explain these changes, and the value of longitudinal studies of crime to test and improve theories at both the individual and collective levels.

For example, Terri Moffitt of the University of Wisconsin has distinguished between those who engage in crime as youth for a brief period of time and those whose criminal behavior begins early and persists for much of their life. Rob Sampson of the University of Chicago and John Laub of the University of Maryland have noted how crime patterns can be deflected by life course changes like marriage, military service, and jobs. Sampson has also reported that developing a sense of community efficacy helps prevent crime. The late Marvin Wolfgang of the University of Pennsylvania and his colleagues distinguished between chronic and non-chronic offenders. The research leading to these distinctions and the subsequent work identifying further variations and their correlates have established the foundation for emerging theories that are empirically grounded. This combined with the substantial longitudinal studies currently underway, most notably the Project in Human Development in Chicago Neighborhoods and similar projects elsewhere in the U.S. and around the world, promise to provide advances that will surely allow us to formulate better prevention and control efforts.

Youth Violence

According to FBI statistics, a juvenile commits one of every six violent crimes. While complex, youth violence is not inexplicable. Three longitudinal studies on the Causes and Correlates of Delinquency funded by the Office of Juvenile Justice and Delinquency Prevention and led by Rolf Loeber of the University of Pittsburgh, Delbert Elliott of the University of Colorado, and Terence Thornberry of the University at Albany, have helped to identify factors that lead youth to commit crimes. Further research on cognitive, emotional, and social development and sociocultural factors has revealed many factors contributing to delinquency: inadequate mental health services, stress in families that interferes with parents focusing on a child's emotional needs, and observed violence in the family or in the media. As this knowledge base has grown, interventions designed to reduce aggression and enhance pro-social skills have been developed. These include programs that identify at-risk children and involve parents, peers, and teachers to provide children with social skills training, help with parent-child relationships, academic tutoring, and home visiting.

In addition, there has been an emphasis on prevention where research has determined how best to help youth develop in healthier ways to avoid negative outcomes. This has generally focused on understanding the risk and protective factors that impact adolescent development. Risk factors describe characteristics of individuals and environments that are associated with an increased probability of maladaptive developmental outcomes, including criminal behavior. On the other hand, protective factors reduce the probability of negative outcomes under conditions of high stress. The Search Institute, building on research by Peter Benson and his colleagues, has identified 20 internal and 20 external factors that "protect" and lead to healthy youth development. These include valuing school, engaging in after school activities, and adopting strong character traits. These strengths cut across problem areas so that building a few key assets prevents multiple related problem areas such as crime, violence, teen pregnancy and substance abuse. Federal agencies and foundations have recognized the importance of asset development.

Hate Crimes

Hate crimes are violent acts against people, property, or organizations because of belonging to or identifying with a group. A recent volume by Valerie Jenness of the University of California at Irvine and Ryken Grattet of the University of California at Davis, *Making Hate A Crime: From Social Movement to Law Enforcement*, discusses the evolution of the hate crime domain. Targeting of victims can be based on a wide array of real or perceived characteristics, including race/ethnicity, gender, sexual orientation, religion, or disability. Hate crimes are not random, uncontrollable, or inevitable occurrences, but rather the result of psychological and social processes that foment prejudice and the inclination to act violently upon it.

Research indicates, for instance, that among perpetrators, "ideology assailants," "thrill seekers," and "self-defense assailants" can be distinguished motivationally. Victims of hate crimes are more likely than victims of many other crimes not to report them because they fear retaliation or they believe there is bias in the criminal justice system against the group to which they belong. The behavioral and social sciences understand these dynamic processes. The research community has worked actively in the last decade to raise public awareness of the roots and consequences of hate crimes. Congress has understood this in recent debates on hate crimes legislation.

Hostage Negotiations

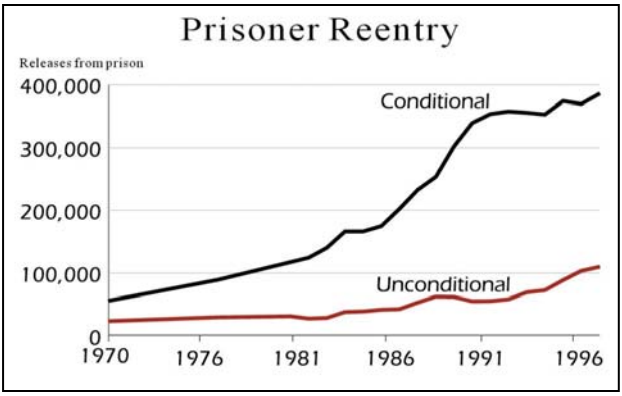
Today, there are increasing demands for the effective and appropriate use of "crisis negotiation" in peacefully resolving potentially violent encounters, including prison riots, criminal actions, terrorist threats, suicide attempts, and hostage-taking situations. Yet, not all attempts at crisis negotiation are successful. When negotiation fails, people are typically injured or killed, including hostages, law enforcement officers, innocent bystanders, and hostage takers.

In the late 1980s scholars began researching the communicative dynamics of crisis negotiation. Early work on crisis negotiation dynamics focused on motivational and psychological characteristics of perpetrators, the effects of being held captive, (e.g., the Stockholm Syndrome), and the affective manifestations of crisis management for negotiators. This information provided valuable practical insights about the effects of emotional distress and heightened uncertainty on the parties in a crisis/hostage negotiation. More recent studies have examined the communicative dynamics of crisis/hostage negotiation. This involves an interactive assessment of the communicative behavior of both the perpetrator and the negotiator.

Mitchell Hammer of American University and Randall Rogan of Wake Forest University have developed one theoretical framework and applied negotiation strategy for de-escalating crisis situations, which they term the "S.A.F.E." model of crisis negotiation. Based on their research, Hammer and Rogan found that de-escalation and escalation processes in crisis situations are primarily triggered within four fundamental "frames": (1) Substantive demands and interests (the instrumental wants/demands made by each party), (2) Attunement (the relational trust established between the parties), (3) Face (the degree of face honoring/threatening parties express toward one another), and (4) Emotion (the degree of emotional distress) each of the parties are experiencing in the crisis situation. These authors have developed both a conceptual framework for "tracking" interactively these four communicative dynamics and have identified specific strategies for de-escalating conflict within each of the four "frames." This model has been integrated into the incidence response operations of law enforcement agencies.

The Future

In order to continue to reduce crime even further, the future research agenda has many items. There will be continued evaluation of policing strategies, including longitudinal evaluations of the effectiveness of community policing. Social and behavioral scientists will examine the consequences of the incapacitation strategy that created the huge American prisoner population during the last decade. This will include evaluating the effectiveness of sanctions, such as "three strikes and you're out." In addition, a major focus will look at the re-entry of the large amount of these prisoners back into society.



More prisoners are returning to society now than at any point in the nation's history.

Source: Justice Research and Statistics Association

The Department of Justice has asked for further study on the imposition of the death penalty. Social scientists will continue to more closely examine the issues of racial disparities, jury instructions, and prosecutorial discretion with regard to this ultimate sanction.

Additionally, researchers will increase their attention to white-collar and international crime. They will conduct further evaluations of the effectiveness of various supply-control efforts to diminish drug abuse and the use of alternative sanctions such as drug courts and treatment as opposed to incarceration.

Finally, in light of recent events, there will be examinations of the causes and correlates of terrorism.

4. INCREASING PROSPERITY

Increasing people's income and wealth is a goal of all democratic societies. To achieve prosperity, governments seek to establish policies to generate economic growth, enhance the skills of their workforce, reduce poverty, and provide for financial security in times of unemployment, the loss of the family breadwinner, or retirement.

Research in the social and behavioral sciences has provided policymakers with information to develop the means to accomplish those objectives. Advances in economics, such as experimental economics, computational economics, and longitudinal databases like the Panel Study of Income Dynamics, have enhanced scientists' ability to explain economic and social activities and promising developments in the future.

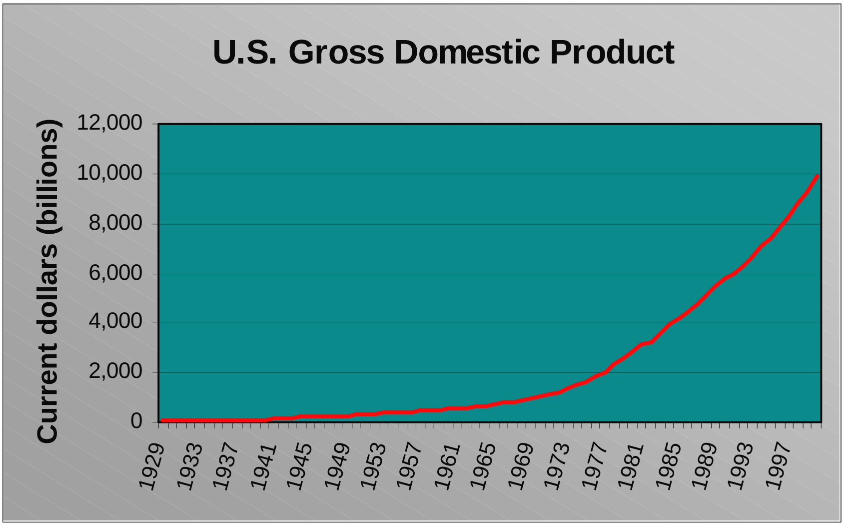
What we now know through social science research has led to higher economic growth, a globalized economy, more diverse and better-trained workers, more effective anti-poverty policies, and a more secure retirement system.

Economists and other social scientists who specialize in economy-related social phenomena routinely occupy policy positions at various levels of government. They provide assistance to policymakers in such vital institutions as the President's Council of Economic Advisers, the Congressional Budget Office, Congress' Joint Economic Committee, and the Federal Reserve Board. In addition, academic economists have served in key government positions, most recently Lawrence Summers as Secretary of the Treasury.

Generating Economic Growth

One of the most visible results of our improved understanding of the economy has been the unprecedented economic growth and price stability of the past 20 years. During that time, the country not only experienced low inflation and unemployment rates but also enjoyed the two longest peacetime expansions in American history. Research inputs into monetary policy have played a key role in reducing inflationary pressures, improving the short-run tradeoff between unemployment and inflation, decreasing the severity of economic downturns, and increasing the length of economic expansions.

A significant element in economic growth during the past 50 years has been technological change. MIT Emeritus Professor Robert Solow's economic growth model developed in the 1950s, for which he won the Nobel Prize, identified in a systematic way the economic importance of technology in addition to such standard traditional factors as capital and labor.



Source: Bureau of Economic Analysis

Gross domestic product rose sharply in the last quarter of the 20th century.

Subsequent research by Robert Barro of Columbia University and Paul Romer of Stanford focused on how education, family, public sector institutions, and labor and capital markets function, and how incentives are able to produce new ideas and knowledge. These factors, in turn, create the technologies and innovations that drive economic growth. Thus, governments have adopted policies that continue to support the development of the information technology industry and the encouragement of private and university research and development.

Economic research has played a large part in the improved implementation of macroeconomic policy. Researchers now take more fully into account the long lags, the small multipliers, and the resulting weaknesses of fiscal policy. Policymakers also now understand the lack of any long-run tradeoff between unemployment and inflation, a finding originally reported by Nobelist Milton Friedman of the Hoover Institution and Edmund Phelps of Columbia. Stanley Fischer of MIT and the International Monetary Fund has also demonstrated the negative effects of high inflation on economic growth rates, thus focusing macroeconomic policy on low inflation targets.

Monetary policy, like fiscal policy, has long and unpredictable lags but has nevertheless been used in an increasingly effective manner. The refinement of monetary policy targets such as interest rate levels and money supply growth rates, for example, has been part of that success. Friedman originally proposed such targets. The further contributions of other researchers have significantly improved our knowledge of how to accurately define these targets. As a result, recommendations for policy operations have evolved from a simple monetary growth rule by Friedman to the more sophisticated rule proposed by John Taylor of Stanford. Taylor accurately describes current monetary policy implementation by focusing on inflation and Gross Domestic Product growth. In addition, the discussion of rules versus Federal Reserve discretion continues as a policy management issue.

Economists have made considerable research progress in measuring the effects and meaning of federal budget deficits. Examples include the adjustments in deficits (and surpluses) proposed

Lawmakers and federal officials ring the opening bell at the New York Stock Exchange.

Source: U.S. Census Bureau

by the late Robert Eisner of Northwestern University to account for the effects of inflation and the nature of spending, whether for consumption or investment purposes. Lawrence Kotlikoff of Boston University and Alan Auerbach of the University of California, Berkeley have developed the concept of generational accounting which explores the costs of deficits, identifies the generations that will pay the government's bills, and determines whether or not current taxing and spending policy is sustainable. Over 30 nations have undertaken research on developing generational accounts.

During the 1990s economists played a significant role in helping policymakers design policies that decreased and eventually eliminated the deficits. Studies that examined income accounts, distinctions between structural and cyclical deficits, and generational accounting for tax expenditures and deficits were important. The long-term effect of national debt remains important, complex, and still unresolved.

The Global Economy

As the economy globalizes, social scientists continue to study many aspects of this new world. Some have examined the development of global capital markets, transitions from command economies to market economies, and currency reinvention, particularly in Europe. Others have examined recent crises in financial markets, such as the peso devaluation in Mexico and the Asian meltdown in the late 1990s. The Nobel Prizewinning work of Columbia University's Robert Mundell on exchange rates has helped lay the intellectual groundwork for Europe's common currency.

In studying the transitions to market economies, American economists such as Stanley Fischer, Anne Krueger, and more recently announced Nobel Prizewinner Joseph Stiglitz, have been important resources to key institutions such as the World Bank and the International Monetary Fund. Social scientists have also focused on the need to study how legal and social institutions change in these transitions to market economies. The results of abrupt versus gradual economic change has also been examined.

The development of regional markets and their role in the new international economy is another area of study. Perhaps most importantly, research on the international trade system, from analyses of Uruguay Rounds, GATT, NAFTA, and the European Common Market, to the development of the World Trade Organization, is providing international policy makers with information to move forward in creating this new trading system.

In addition, analyzing the new multinational corporations and the recent spate of multinational mergers will keep researchers occupied for many years. Some of the research on this topic by sociologists, economists, and geographers such as the late Bennett Harrison of the Carnegie Mellon University, Janet Kodras of the University of Florida, and William Julius Wilson of Harvard University have examined how locational and investment decisions by multinational corporations result in increased gaps in living standards among national populations, disinvestment in urban areas, and deindustrialization in the United States. Saskia Sassen of the University of Chicago found that the concentration of managers and professionals, especially in large global cities, is linked to the shift away from capital accumulation in heavy manufacturing to capital accumulation in services and high technology production. Congressional concern over corporate decisions to leave American cities and communities led to the passage of Plant Closing Notification legislation.

Labor Force

Human capital formation, particularly the development of technologically sophisticated workforces, is another arena for research. Harvard Economists Lawrence Katz and Claudia Goldin, among others who have examined the widening wage gap, show the increasing importance of education in preparing a workforce capable of keeping up with the rapid and accelerating pace of technological change. Nobelist James Heckman of the University of Chicago has developed methods for analyzing dynamic longitudinal labor force data and applied these methods successfully to determine which manpower training programs work.

Of special interest to economists and sociologists has been the large influx of women into the labor market. Numerous social scientists have investigated the dramatic segregation of the sexes into different occupations, industries, and (within industries) specific jobs. Others have examined occupational segregation among women of color

NLS: NATIONAL LONGITUDINAL SURVEYS OF LABOR MARKET EXPERIENCES

The National Longitudinal Surveys (NLS), sponsored and directed by the Bureau of Labor Statistics at the U.S. Department of Labor, gather detailed information about the labor market experiences and other aspects of the lives of six groups of men and women. Over the years, a variety of other government agencies, such as the National Institute of Child Health and Human Development, the Department of Defense, the Department of Education, the Department of Justice, the National Institute on Drug Abuse, and the National School to Work Office, have funded components of the surveys that provided data relevant to their missions. As a result, the surveys include data about a wide range of events, such as schooling and career transitions, marriage and fertility, training investments, child-care usage, and drug and alcohol use. The depth and breadth of each survey allow for analysis of an expansive variety of topics such as the transition from school to work, job mobility, youth unemployment, educational attainment and the returns to education, welfare recipiency, the impact of training, and retirement decisions.

The first set of surveys, initiated in 1966, consisted of four cohorts. These four groups are referred to as the "older men," "mature women," "young men," and "young women" cohorts of the NLS, and are known collectively as the "original cohorts." In 1979, a longitudinal study of a cohort of young men and women aged 14 to 22 began. This sample of youth was called the National Longitudinal Survey of Youth 1979 (NLSY79). In 1986, the NLSY79 was expanded to include surveys of the children born to women in that cohort and called the NLSY79 Children. In 1997, the NLS program was again expanded with a new cohort of young people aged 12 to 16 as of December 31, 1996. This new cohort is the National Longitudinal Survey of Youth 1997 (NLSY97).

The NLS website is *http://Stats.bls.gov/nlshome.htm*.

The results of occupational segregation were differential promotion rates, training, and wages; women's jobs had fewer of these benefits. One explanation for occupational segregation emphasized institutional factors and especially the processes of recruitment, hiring, training, and promotion that favored one sex over another.

Sociologists, anthropologists, industrial organization, and human factor psychologists have studied working environments and suggested how to improve their climate for increased productivity. Developments in organization theory and psychology have led to a revolution in personnel policies and in techniques for organizing complex and interactive environments. The "team" concept of organizing production follows directly from the insights of game theory and incentive arrangements developed by economic research. It is among the most visible and applied manifestations of this research.

Migration and the development of global labor markets have also been studied. Sociologists have been particularly interested in the relationship between national governments and types of market relations. Some of this work, such as that by Roger Waldinger of the University of California at Los Angeles and Alejandro Portes of Princeton University, links macro-level forces such as capital flows with micro-level actions including migration, job search, skill attainment, and ethnic niches.

In addition, social scientists have studied labor force migration and immigration. The work of James Smith of RAND and others have measured the economic impacts of immigration, including the contributions that immigrants have made to the development of a number of service and high technology sectors in the U.S. economy. The research of Douglas Massey of the University of Pennsylvania on international migration (especially from Mexico) has contributed significantly to discussions of immigration policy. The major revisions to immigration policy in the past two decades and the continuing discussion in the Bush administration have clearly been influenced by social and behavioral science research. The National Science Foundation recently awarded Smith a major grant to support the New Immigrant Survey that will examine the fundamental questions concerning the short-run and long-run prospects for immigrants and their children.

Reducing Poverty

For many years, social scientists have been analyzing poverty in America and around the world. There have been and continue to be many debates over the definition of poverty. Harvard's William Julius Wilson's seminal work demonstrated how concentrated poverty impacts neighborhoods and how government and business policies help create that poverty. Social historians Theda Skocpol of Harvard and Michael Katz of the University of Pennsylvania have documented the historical patterns and trends in poverty and social welfare. Three volumes emerging from conferences sponsored by the Institute for Research on Poverty at the University of Wisconsin at Madison explore how poverty is understood, fought, and confronted. The studies painted a picture of the level and composition of poverty over time and explored the effectiveness of alternative public policies aimed at reducing poverty. Timothy Smeeding of Syracuse University and his colleagues in the Luxembourg Income Study have given us a comparative perspective on income inequality. Several researchers including Rebecca Blank of Michigan, Richard Freeman of Harvard, Harry Holzer of Georgetown and many others have studied the impact of labor markets on poverty. David Ellwood of Harvard and John Karl Scholz of Wisconsin at Madison provided policymakers with data and analyses that evaluated the implementation of the Earned Income Tax Credit that has helped the working poor.

The great national debate in the mid-1990s resulting in the overhaul of national welfare policy was influenced by both this poverty research and evaluations of experiments that had been implemented at the state and local level. In this debate, research and politics sometimes clashed as policymakers ignored some evidence and moved forward with their own instincts. Nevertheless, the end result was the overhaul of national welfare policy.

In particular, the welfare-to-work provisions relied on research regarding the effectiveness of a variety of programs and policies to increase work, wages, and productivity. Much of this research measures the social costs and benefits of alternative work-oriented policies.

Some studies examined how low-income single mothers (both those receiving some form of government assistance and those who have low-paying jobs) get by on a daily basis. In-depth interviews conducted by anthropologist Laura Lein of the University of Texas at Austin and sociologist Kathryn Edin of the University of Pennsylvania, done in the mid-1990s showed that neither welfare nor low-wage employment provided enough income to allow these mothers and their families to survive without severe hardships. Edin and Lein demonstrated the importance of health care, child care, and a living wage to help these mothers.

Following passage of the 1996 Welfare Reform Act, numerous researchers used both administrative and survey data to assess the impact of the reform on the well-being of families who left welfare under the new policy. One key question is whether increases in work and earnings have been able to offset the loss of cash assistance. As the Personal Responsibility and Welfare Reform Act comes up for reauthorization, the results of these studies will influence the debate. William Julius Wilson, Linda Burton of Pennsylvania State University, and Andrew Cherlin of Johns Hopkins University have begun a major multi-site project studying the consequences of welfare reform on the lives, health, and well-being of families and their children.

Part of the debate about welfare will focus on what is required to move households out of poverty as well as off welfare. Efforts to answer this question have raised further questions about the measurement of poverty. In 1995 the National Academy of Science released a report, edited by social scientists Constance Citro and Robert Michels that provided a new approach to measuring poverty which better reflected the needs and income sources of the working poor, including taxes, child care expenses, medical expenses, child support payments, and non-cash benefits. Many of these issues are examined by University of Maryland sociologist Sandra Hofferth, who scrutinizes the impact of welfare reform in terms of persons in poverty.

Other studies, by Gary Sandefur of Wisconsin at Madison and Sara McLanahan of Princeton, psychologists such as Jeanne Brooks-Gunn of Columbia, and economists Greg Duncan of Northwestern, Robert Haveman and Barbara Wolfe of Wisconsin, have explored the effects of family, school, and neighborhood characteristics on children's attainments.

These researchers have noted the relationship between parents' low education and income and economically poor neighborhoods on children's health and development. These inadequacies result in low birth weight, high secondary school dropout rates, non-marital teen pregnancies, and joblessness.

Limited economic resources are also associated with increased family stress and conflict, child abuse, and children's aggressive and delinquent behavior. This information has contributed to the development of policies designed to increase family and community investments in children and revision of Head Start and child nutrition programs.

A Secure Retirement

The debates over Social Security, Medicare, and other programs that strive to ensure a financially secure retirement have been highly influenced by social science research. Demographic models play an important role in establishing boundaries around population forecasts that underlie the Social Security system, the cost implications of an aging population for the health care sector, and the long-term changes in the composition of age structures and its impact on businesses.

The research of sociologists and economists has told us much about how, when, and why people retire, what they expect from retirement, and how they intend to afford it. The Health and Retirement Survey and the Assets and Health Dynamics Among the Oldest Old survey are longitudinal efforts to track people's retirement decisions and later life choices. Previous data collections, like the National Longitudinal Surveys of Labor Market Experiences, provided early information on these phenomena. The Panel Study of Income Dynamics has also longitudinally tracked people's work and, more recently, health experiences over a lifetime.

Economic analyses of the viability of the social security system have played an important role in policy decisions. A bipartisan commission in the mid-1980s changed how Social Security operates and now the Bush administration has once again turned to a commission, which includes social scientists such as Olivia Mitchell of the University of Pennsylvania and Thomas Saving of Texas A&M, to evaluate what should be done. Henry Aaron of the Brookings Institution, Martin Feldstein, President of the National Bureau of Economic Research, and John

PSID: PANEL STUDY OF INCOME DYNAMICS

The Panel Study of Income Dynamics (PSID), begun in 1968, is a longitudinal study of a representative sample of U.S. men, women, and children and the family units in which they reside. It emphasizes the dynamic aspects of economic and demographic behavior, but its content includes sociological and psychological measures. As a consequence of low attrition rates and the success in following young adults as they form their own families, the sample size has grown from 4,800 families in 1968 to more than 7,000 families in 2001. At the conclusion of 2001 data collection, the PSID will have collected information about more than 62,000 individuals spanning as much as 34 years of their lives.

The PSID data files provide a wide variety of information about both families and individuals. The central focus of the data is economic and demographic, with substantial detail on income sources and amounts, employment, family composition changes, and residential location. Content of a more sociological or psychological nature is also included in some waves of the study. Information gathered in the survey applies to the circumstances of the family unit as a whole (e.g., type of housing) or to particular persons in the family unit (e.g., age, earnings). While some information is collected about all individuals in the family unit, the greatest level of detail is ascertained for the primary adults heading the family unit.

Maintaining the comparability of the data throughout time is crucial for a panel study. Over the years, the general design and content of certain variables have remained largely unchanged. The central focus is to maintain a clean and consistent time series of core content – income sources and amounts, employment, family composition changes, and demographic events – based on the study's annual interviews. Beginning in 1985, comprehensive retrospective fertility and marriage histories of individuals in the households have been assembled. Other important topics covered by the PSID ► include housing and food expenditures, housework time, health (recently designed 1999 module), consumption, wealth, pensions, and savings.

In the early years, respondents were asked about their housing and neighborhood characteristics, child care, achievement motivation, job training, and retirement plans. In more recent years, special topics included extensive supplements on education, military combat experience, health, kinship networks, and wealth. Supplements in the early 1990s contain a rich set of questions regarding the health of family members aged 55 and above: general health status, activities of daily living, nursing home stays, home-based care episodes, and major health expenditures. In addition, the Child Development Supplement (CDS), first fielded in 1997, focused on the human capital development of approximately 3,600 children age 0-12 in PSID families, included extensive measures of the children's home environment, family processes, children's time diaries in home and at school, school and day care environment, and measures of their cognitive, emotional and physical functioning.

PSID's website is *www.isr.umich.edu/src/psid*.

Shoven of Stanford are among the many economists who have examined the financial health of the Social Security system. Feldstein and Shoven have been at the forefront of the Bush Administration's push for partial privatization, while Aaron has suggested the social security system is in better shape than some people think. Social scientists have also studied how the existing private pension system affects people's retirement choices.

The Future

Social scientists have made enormous progress in understanding the economy. However, the global economy in which we live is extraordinarily complicated and difficult to understand. More and better scientific research is necessary if policy makers expect to have an adequate knowledge base to deal with future international financial crises, help countries achieve successful transitions away from communism, and prepare for the economic dislocations that accompany terrorism and war.

Researchers have also made progress in understanding the process of economic growth. But economies are dynamic processes and much will always be left undone. The slowing growth of the 1970s and 1980s and the rapid growth in the late 1990s still need better explanations. The roles of saving, investment, and technology development in growth remain important policy questions.

The apparent decline of the natural rate of unemployment that occurred throughout the 1990s, and the imperfections leading to fluctuations around the natural level of output, present additional opportunities for research. All have the potential for contributing to monetary policy implementation. A better understanding of the costs of moderate inflation will make the conduct of monetary policy easier.

Economists do not fully understand the costs of trade deficits or the mechanisms by which international financial panics and crises can affect the growth and stability of economies. Given the rapid expansion of world trade and international capital flows, understanding these issues will be crucial to developing appropriate policies.

Also worthy of continued research is the impact of movement of jobs, capital investment, and labor within the U.S. and across nations and the types of incentives that can affect such flows.

Debate continues about the costs of federal budget deficits. Further research has the potential to help identify those costs and the conclusions are likely to influence economic growth and budget policy.

New computational tools will provide improved capabilities not only to explain economic behavior but also to help enhance economic forecasting. Simulations of market mechanisms developed by Charles Plott of the California Institute of Technology and others will continue to be refined to improve allocation decisions. The increasing use of microdata simulations will help provide better comprehension of the effects of poverty policy on individuals.

5. IMPROVING HEALTH

Long ago, in medicine, all healing was a matter of behavior and attitude. The causes of disease were seen as spiritual, the province of priests and shamans who knew little about the human body and thus treated what were essentially the mind and the emotions. Ultimately, however, the West, along with the Islamic cultures of the Middle East and Central Asia, developed biology as a science and thus established what came to be known as allopathic medicine.

While biological research has advanced medical knowledge and yielded cures to many illnesses, public and private health officials have recognized the need to incorporate human behaviors and social factors into the process of understanding disease and promoting health. As Health and Human Services Secretary Tommy Thompson recently noted, ". . . many of our health problems can be avoided through diet, exercise, and making sure we take care of ourselves. By promoting healthy lifestyles, we can improve the quality of life for all Americans, and reduce health care costs dramatically."

Several important developments in the last twenty years have contributed to this shift toward a fuller perception of health and disease, not the least of which was a 1982 Institute of Medicine (IOM) report entitled *Health and Behavior: Frontiers of Biobehavioral Research.* This study contained data that identified diet, exercise, and smoking as major components in the cause of cancer and heart disease. The implication of the report was obvious: medicine needed to utilize the social and behavioral sciences in reducing the morbidity and mortality of several major diseases. Much of the research that has ensued since then focuses on defining and evaluating attempts at behavior change or modification as key factors in the prevention of disease. A recent study has noted, for example, that diet and exercise can limit the onset of adult diabetes.

Following the IOM report, the National Institutes of Health (NIH) began to slowly incorporate the social and behavioral sciences into its research portfolio. In 1992, the Alcohol, Drug Abuse, and Mental Health Administration (ADAMHA) was dissolved as part of a general reorganization that incorporated into the NIH structure the National Institute on Alcoholism and Alcohol Abuse (NIAAA), the National Institute on Drug Abuse (NIDA), and the National Institute on Mental Health (NIMH).

Further recognizing the growing significance of the social and behavioral sciences, Congress in 1993 created the Office of Behavioral and Social Science Research (OBSSR) in the NIH director's office. Under the leadership first of Norman Anderson, and now Raynard

Kington, the office has become a focal point for the advancement of behavioral and social research across all of the NIH Institutes and Centers. Other Health and Human Services Department agencies, such as the Centers for Disease Control and Prevention, have also added programs that relate behavior to health.

Two other issues have further expanded NIH work in behavioral and social science research. One has been concern over health disparities, an issue that has led to the creation of the NIH's Center for Minority Health and Health Disparities. The other involves the ethical, legal, and social implications (ELSI) of research and discoveries related to the human genome. These issues were seen as high priority early on and were incorporated in the National Human Genome Research Institute (NHGRI) when it opened its doors in 1989.

Alcohol Abuse and Alcoholism

Significant changes to national policies made in recent years have played major roles in reducing injuries and fatalities from use and abuse of alcohol. Behavioral research showed that while drivers aged 16-21 comprised only 13 percent of all motor vehicle operators, these individuals were responsible for 25 percent of alcohol-involved fatal crashes. These data influenced the enactment of legislation that

Research on prevention of alcohol abuse is coming into its own, with proven benefits.

Photo by Chris Ryan, COSSA

required states to raise their minimum legal drinking age (MLDA) to 21 as a condition of receiving federal transportation funding. All 50 states eventually complied with the law, and the U.S. Supreme Court, using in part scientific evidence, upheld it.

As adjuncts to the MLDA legislation, the Federal government and several state governments have developed public education campaigns against drinking that include mandating warning labels on alcoholic beverages and requiring producers to print on beverage containers messages about the impacts of alcohol on pregnancy. These campaigns could not have been undertaken without considerable research on attitudes and behavior in connection to drinking. Further research has shown that the labeling of bottles of alcohol has changed public attitudes about drinking. There is also evidence that the proportion of individuals who decided not to drink and drive has increased in recent years. Finally, rising numbers of pregnant women have also opted to limit their alcohol consumption.

Social and behavioral researchers are currently working on a number of studies aimed at reducing the impact of alcohol throughout society and limiting incidences of alcohol abuse among individuals from all segments of the population. One specific program that has drawn a great deal of attention from policymakers is NIAAA's College Drinking Initiative, which is focused on improving prevention efforts and treatment programs at schools around the country.

Cancer and Smoking

As the Institute of Medicine points out, smoking is the leading preventable cause of premature death in the United States. Since the release of the Surgeon General's report in 1964, the public health sides of federal and state governments have committed themselves to promoting ways to reduce smoking. These efforts have been varied and include class action lawsuits against tobacco companies, imposing heavy taxes on cigarette purchases, halting advertising, banning smoking in public places, and attempting to abolish tobacco sales to minors. Social and behavioral science research results have helped with all of these efforts.

The National Cancer Institute (NCI), as the nation's focal point for cancer research, has provided support for studies to examine smoking and its relation to cancer. The Institute's efforts in behavioral and social research have increased in recent years and have been significant factors in public health and policymaking. Working on the level of the individual smoker, with investigations into smoking cessation activities, and on the societal level, with a focus on advertising, price, and availability, researchers have contributed to interventions to reduce smoking and therefore to reduce lung and other cancers. In addition, the National Institute on Drug Abuse has focused on nicotine as a drug and how to end addiction to it. The Centers for Disease Control and Prevention have also played an important role in the effort to reduce smoking, particularly through approaches that deglamorize the act of smoking.

Social and behavioral researchers have produced evidence of who smokes, what cessation programs work, and how to stop people from smoking in the first place. There have been successes in reducing smoking, particularly among men. Smoking by women has more recently become a problem and female lung cancer rates have begun to soar. We know that socioeconomic status is related to smoking, with the poor and least educated most likely to light up. We know that African-Americans respond less well to antismoking campaigns. And we know that individual-oriented cessation campaigns use motivational, educational, and behavioral techniques derived from social and behavioral research.

Since smoking is now treated as a public health problem, community approaches to halting smoking have become prevalent. Social science research has noted that changing societal norms – shared rules and expectations – produces a system of formal and informal guidelines for the appropriateness of behaviors. Thus, making the social environment hostile to smokers has been effective at reducing the number of smokers. Accordingly, policies that prohibit advertising can have a large impact on reducing smoking onset among youngsters.

Nutritional Needs and Child Development

Research data have made it clear that what happens in early childhood impacts an individual's entire life course. Accordingly, policymakers have sought ways to ensure that every child has all the resources needed for healthy development from the moment they are born. One of those fundamental resources is good nutrition, critical for a child's physical growth and learning.

Unfortunately, good nutrition in early childhood remains more a goal than a reality in contemporary America. Even in an affluent society mild forms of malnutrition can be disturbingly common and can affect a child's ability to learn. Toddlers with iron-deficiency anemia or deficiencies in essential minerals and vitamins talk and play less ably than those who are sufficiently nourished.

Nutritional deficits are found in both developed and developing countries. It is estimated that approximately one-third of children under the age of five in developing countries are malnourished. In the United States, current surveys show that more than one million children consume less than 70 percent of the calories they need on a daily basis. More than 25 percent of poor children suffer from iron deficiency.

Diet and good nutrition also affect the development and functioning of the central nervous system, and there appear to be permanent effects on brain development when nutrition is lacking. The effects of malnutrition are linked to individual differences in temperament domains, such as emotionality, as well as in cognitive domains.

The policy implications of these recent findings are clear. Government sponsored programs that address nutritional needs of children are critical. The Women, Infants and Children (WIC) program has proven to have great beneficial effects for expectant mothers and their infants. Food stamps have provided millions of families with resources to improve their nutrition, but accompanying educational programs have been found to be invaluable as well. School breakfast and lunch programs are also important in overcoming nutritional deficiencies. Overseas aid programs, particularly the Food for Peace program, have also helped alleviate some of the problems in developing countries.

While malnutrition remains a problem, childhood obesity, conversely, has become a major health concern. Although the problem is complex, data have led researchers to conclude that behavior patterns in childhood result in obesity in adulthood. As a result, school officials have relied on studies to plan programs in both nutrition education and physical fitness as means to control weight. In addition, school officials nationwide have used behavioral research to plan health courses with targeted interventions that encourage children to maintain a healthy diet throughout their lifespan. Controlling obesity at an early age will foster healthier lifestyles that can reduce incidences of cancer, diabetes, heart disease, and other debilitating illnesses.

Adolescent Health

Few areas of social and behavioral research have provoked as much controversy as studies relating to the health of adolescents, particularly their sexual behavior and drug and alcohol abuse. The National Longitudinal Survey of Adolescent Health, with J. Richard Udry of the University of North Carolina at Chapel Hill as principal investigator, has data on 90,000 students from grades seven through 12.

Results from the survey suggest that adolescents have strong romantic or sexual networks in their schools that make transmission of sexual diseases easy. Parents, who were also interviewed in the study, generally underestimated the sexual activity of their children. Recent statistics from the Centers for Disease Control and Prevention show that sexually transmitted diseases (STDs) and cases of teen pregnancy, although on the decline, are disturbingly prevalent in the United States. Since research has discovered that parents seem reluctant to deal with their children's sexual activity, most school systems now require instruction on STD prevention. Research into the effectiveness of abstinence programs continues and indicates that pledges of virginity lead to postponement of first sexual experience by young teens and therefore to lower incidences of STD and teen pregnancy. Other work continues to investigate the effectiveness of programs advocating safe sex and birth control.

Monitoring the Future is a national survey that examines adolescent behaviors, beliefs, and attitudes about drug, alcohol, and

HHS Secretary Donna Shalala and National Drug Control Policy Director Barry McCaffrey announce the findings of the 2000 Monitoring the Future *Survey, which measures attitudes and behaviors of adolescents on drug use*

Source: U.S. Department of Health and Human Services

tobacco use. It has become an important instrument for guiding policymakers' decisions on these issues. However, as in a number of public policy areas, persuasive research results often become lost in ideological and religious debates.

Add Health: THE NATIONAL LONGITUDINAL SURVEY OF ADOLESCENT HEALTH

The National Longitudinal Study of Adolescent Health (Add Health) focuses on forces that influence adolescents' behavior, in particular those residing in the various contexts of their lives: families, friendships, romantic relationships, peer groups, schools, neighborhoods, and communities.

Health is something adolescents tend to take for granted. Their energies are directed toward achieving popularity, autonomy from adults, success in school or sports, satisfying romantic and platonic relationships, and confidence in themselves. In trying to achieve such goals, however, the choices they make can involve health-related behavior, and – although adolescents have little opportunity to choose the communities in which they live, the people with whom they live, or the schools they attend – these environments define and limit the choices available to them.

The Add Health study collects data to use in exploring the influences of both the individual attributes of adolescents and the attributes of their various environments on health and health-related behavior in areas such as diet, physical activity, health service use, morbidity, injury, violence, sexual behavior, contraception, sexually transmitted infections, pregnancy, suicidal intentions/thoughts, substance use/abuse, and runaway behavior. Data are collected also on such attributes as height, weight, pubertal development, mental health status (focusing on depression, the most common mental health problem among adolescents), and chronic and disabling conditions. ►

Data are gathered from adolescents, their parents, siblings, friends, romantic partners, and fellow students, and from school administrators. Existing databases provide information about neighborhoods and communities. With data from so many sources, new types of analyses are possible, involving both separate and joint effects of surroundings and circumstances on behavior and health status.

The Add Health study is longitudinal, with adolescents interviewed for a second time after one year. Instead of relying on respondents' memories and reconstructions of past events, it is thus possible to measure directly the influence of their experiences on their behavior at one point in time, and its consequences at another. The study's website is *www.cpc.unc.edu/addhealth*.

Cardiovascular Disease

Heart attacks remain the number one killer of Americans and over 13 million people are living with coronary heart disease. Behavioral and social factors such as smoking, hostility, anger, stress, depression, physical inactivity, and social isolation contribute to cardiovascular disease. Research points to behavioral and social interventions that help patients manage their disease and live healthier and longer lives. Supplementing cardiac rehabilitation care with behavioral counseling may lower recurrence rates by as much as 50 percent over five years. A rigorous, multimodal program of stress management, diet modification, and exercise can cause regression of atherosclerosis in the coronary arteries.

Minority Health Disparities

Social scientists expend research effort to understand how cultural, social, economic, policy, and institutional processes make race and ethnicity appear to be such powerful predictors of health outcomes. On most measures of morbidity and mortality, America's racial and ethnic minorities fare more poorly than the majority white population. In trying to explain these disparities, David Williams of the University of Michigan and David Takeuchi from Indiana University have attempted to disentangle the effects of factors such as health behaviors, types of diseases, socio-economic status, access to health care, and differences in treatment. Their findings and those of others are leading to important reassessments of every aspect of health services delivery from diagnosis to treatment.

Different racial and ethnic groups vary according to socio-economic characteristics including age, sex, marital structures, average income, wealth and assets, occupational distribution, and average educational attainment. They also vary in their access to health insurance, with the Hispanic population having the least coverage. Williams has also found that institutionalized patterns of discrimination lead to different treatment practices that affect health outcomes. Discriminatory patterns have been found in patient-practitioner interactions and lack of access to medical care. In addition, a recent study released by the NIAAA indicates that Hispanic males have a higher incidence of liver cirrhosis than other identified groups. This is due to periodic consumption of large quantities of alcohol combined with low socioeconomic status that affects the use of medical care services.

HIV/AIDS

With the lack of a vaccine, the most effective way at present to prevent or reduce the spread of HIV/AIDS is through behavioral change. The primary goal of AIDS-related behavioral and social science research is to discover how to change the behaviors that lead to HIV transmission – including preventing their initiation – and how to maintain protective behaviors once they are adopted. An additional goal is to reduce the stress that HIV/AIDS places on families, the health care system, and society.

Research in the behavioral and social sciences related to HIV/AIDS has revealed a number of important developments. Chief among them was the discovery of the demographic shift of the HIV/AIDS epidemic in the United States during the 1990s. An increasing proportion of new HIV and AIDS diagnoses is occurring among women, racial/ethnic minorities (principally African-American and Latino/Hispanic), and people older than 50 years of age. Increasingly, HIV is transmitted through heterosexual contact in the context of drug and alcohol use. These changes have required the development and refinement of behavioral and social interventions that take into account the complex interplay of gender, age, cultural context, and HIV risk.

Yet, recent data shows that after several years of declines in reported numbers of AIDS cases and deaths across the U.S., the downward trend has ended. Health officials are also concerned with recent studies indicating that risky behaviors are on the rise in populations thought to have largely adopted protective behavior against HIV/AIDS.

Research suggests that it is also important to improve knowledge about how cultural and religious beliefs, socioeconomic conditions, institutional arrangements, and political risk aversion contribute to access and utilization of prevention and care services. Also needing more study, is the relative effectiveness of individual behavioral-change interventions and community-based prevention strategies. Social and interpersonal factors are acute problems in the developing world where stigmatizations of homosexual activity and HIV contraction have made preventive intervention programs difficult. Moreover, some governments have been slow to react to the crisis in their countries.

Social and behavioral scientists have long focused their HIV/AIDS efforts on preventing the spread of the disease. Their work has been an important part of the debate on national AIDS policy. Large-scale HIV-prevention strategies adopted by national and local governments have been effective in reducing transmissions in many countries and cities. Efforts to alter individual behavior, including encouraging the use of condoms, making available sterile drug injecting equipment, and promoting delay or abstention from sex, have all resulted in declines in HIV incidence.

In the coming years, United Nations (UN) and U.S. leaders will be depending on social and behavioral science research findings to plan an international AIDS policy. The UN recently held a special three-day session on AIDS in which the primary goal was to develop and implement national AIDS strategies for all member states by 2005. In meeting this goal, researchers will no doubt be called upon to help in the design of targeted interventions for varied communities around the world. Scientists have already concluded, for example, that adequate sex education is desperately needed in Africa and that a united world effort is necessary to check the spread of AIDS across the globe. To this end, the Bush Administration has pledged $200 million to a new Global AIDS fund, and Congress is expected to consider whether the U.S. should contribute more.

Language and Aging

The country is aging. The number of people over 65 is growing substantially. People are living longer. The number of folks living past

85 and even 100 is mushrooming. Knowledge from the social and behavioral sciences will be required to understand how society will adapt to this revolutionary demographic change. The ability of the elderly to continue to communicate in a meaningful way is one aspect of this gerontological arena. Aging involves biological, psychological, and social changes, which all involve language.

Linguists, psychologists, sociologists, anthropologists, communication scientists, neuroscientists, and speech and language pathologists have studied a wide array of language implications during the aging process. One important area of research examines changes in language and communicative abilities that accompany human aging among healthy individuals and those dealing with health problems that

Photo by Marty Leuders for the U.S. Census Bureau

Elderly friends enjoy a board game.

directly affect language use (Alzheimer's disease and aphasia). Many studies attempt to tie descriptions of particular kinds of language change to possible causes of those changes, including deterioration of the underlying linguistic system, problems of working memory, or just the general slowing down of mental and physical processes associated with normal aging. Many of these studies make explicit diagnostic contributions (e.g., differentiating among types of dementia) for individuals with the disease under study.

A second area of research focuses on how people assume social identities and language use. Scholars are attempting to identify patterns and strategies in the language used by and with elderly people. Work in this area has shown convincingly that age interacts in complicated ways with different social identities. Speech to the elderly from others, for example, often unintentionally but inappropriately assigns them child-like identities. Both the mental and physical health of the aging population stand to benefit from closer attention to the language used in settings ranging from family conversations to physician-patient visits to interactions in nursing homes.

Finally, behavioral scientists have investigated discourse practices of the elderly that display or reflect the speakers' social norms and values. Many of the practices identified in this literature can be understood as responses to change; e.g., complaining, gossiping, comparing the 'way it was' with the 'way it is,' disclosing one's chronological age or reciting painful information about the self to relative strangers, and using service encounters to socialize. Such practices and the norms and values they represent are sometimes misinterpreted in intergenerational encounters and can adversely affect everyday interactions.

The Future

Over the last few decades the social and behavioral sciences have been indispensable tools in public health policy and in the fight against disease. There is no doubt that their contributions will continue to grow and expand as the country comes to practice preventive lifestyles on a larger scale. Other issues that promise to demand the best skills of social and behavioral science are accessibility and affordability of health care and the enormous promise of genetic research.

Continued research is essential on socio-economic, behavioral, and institutional factors that result in health disparities among racial and ethnic groups. To conduct such comparative research requires the establishment of data sets that are large enough to allow for valid findings on U.S. minority groups. Also, the issue of health care coverage and the quality of health services delivery, especially for low-income working poor, requires more substantial study and analysis.

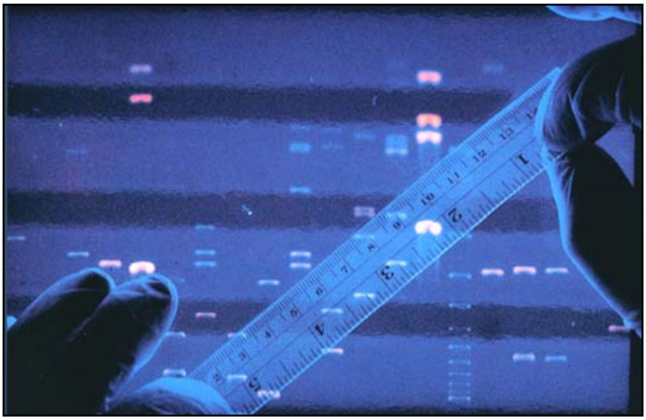
Considerable debate in recent years has surrounded the issue of quality of managed health care. The controversy was the impetus behind the Patients Bill of Rights legislation. Social and behavioral scientists have already conducted extensive research into how managed care has brought with it numerous changes in health care delivery and financing. One question involves the sorts of treatments and diagnoses insurance carriers are willing to cover. Behavioral studies have shown that prevention approaches – such as cancer screenings – are vital in improving public health and so merit coverage by carriers. The debate over such coverage has gained appreciable national prominence in recent years. For example, the host of the "Today" show, Katie Couric, has used her prominence to encourage individuals in at-risk groups to obtain colonoscopies and other vital cancer tests. As policymakers consider bills that would mandate various types of coverage in the coming years, social and behavioral scientists will be asked to add their findings to the evidence under consideration.

Social and behavioral scientists will also contribute to the ethical advice and thinking that policymakers and society will need in the future. As the stem cell debate played out in the summer of 2001, President Bush, members of Congress, and the media all turned to experts at NIH and around the country to assess the ethical questions surrounding this controversy. The stem cell controversy is only one bioethical example among many that have already become part of the array of problems society and its politics will have to deal with. More expertise will be needed to clarify the ethical and social implications imposed by hosts of medical and genetic research advances.

Another problem, perhaps more explosive than that of the stem cell debate, is the debate on genetic privacy. Now that the human genome has been mapped successfully, many medical ethicists fear that employers may avoid hiring and health insurers may refuse coverage of individuals predisposed to certain diseases. The National Human Genome Research Institute (NHGRI) is responding by increasing its support for research on the ethics, legal, and social implications of genetic research.

In the last 12 years only a few cases of an employer using genetic information to appraise its workers have been reported. This doesn't mean, however, that the practice won't expand as genetic testing becomes cheaper and more widespread. Diagnostic firms, in fact, are already beginning to market kits that enable any individual to test his or her own DNA for abnormalities. Federal employees have been protected from genetic discrimination by Executive Order, but no such legal safeguards exist for individuals working outside of the government. Last year, the Senate debated a bill that would prohibit employers and insurers from using genetic information to discriminate. Although the bill was defeated in a close vote, it is sure to resurface.

President Bush stated his support for such a measure during one of his weekly radio addresses in the first weeks of his administration. The President closed the address by saying, “We will all gain much from the continuing advances in genetic science. But those advances should never come at the cost of basic fairness and equality under law.” Social science research on genetics is clearly already playing a role as policies are being considered, and this role will only grow larger as the deliberations intensify in coming years.



Source: National Human Genome Research Institute

HRS: THE HEALTH AND RETIREMENT STUDY

The Health and Retirement Study (HRS), begun in 1990 and funded by the National Institute on Aging, provides data for researchers, policy analysts, and program planners who are making major policy decisions that affect retirement, health insurance, saving, and economic well-being.

The objectives of the study include: explain the antecedents and consequences of retirement; examine the relationship between health, income, and wealth over time; ► examine life cycle patterns of wealth accumulation and consumption; monitor work disability; provide a rich source of interdisciplinary data, including linkages with administrative data; and examine how the mix and distribution of economic, family, and program resources affect key outcomes, including retirement, dissaving, health declines, and institutionalization.

The study is a national panel study with an initial sample of over 12,600 persons in 7,600 households. There are oversamples of Hispanics, Blacks, and Florida residents. The baseline sample, conducted in 1992, was the 1931-41 birth cohort (and their spouses, if married, regardless of age). In 1998 the sample included the newly added 1924-1930 and 1942-47 birth cohorts. There are follow-ups by telephone every second year, with proxy interviews after death.

The topics covered include: health and cognitive conditions and status; retirement plans and perspectives; attitudes, preferences, expectations, and subjective probabilities; family structure and transfers; employment status and job history; job demands and requirements; disability; demographic background; housing; income and net worth; health insurance and pension plans; and experimental modules. The study also has gained permission to establish links with administrative data such as the Employer Pension Study (1993, 1999), National Death Index, Social Security Administration earnings and projected benefits data; and W-2 self-employment data. ►

The Assets and Health Dynamics Among the Oldest Old Survey, now combined with the HRS, includes a national panel study with an initial sample of 7,447 respondents aged over 70 (and their spouses, if married, regardless of age) and a supplemental sample of respondents over 80 years of age. The survey's website is *www.umich.edu/~hrswww*.

6. EDUCATING THE NATION

An educated nation is a productive nation and a more ennobled nation; a nation whose "capital stock" consists of people's workaday skills and the ability to think broadly, precisely, and critically. Economists Gary Becker, Theodore Schultz and Jacob Mincer provided the insights into the importance of developing and nurturing this form of wealth, which they termed "human capital." The challenge that policymakers face today is how to bring research results and policy perspectives into a more coherent view that can enhance the formal educational system's capacity to prepare all of the nation's children for successful lives in an increasingly complex global community.

The nation's 15,000 local school districts comprise a system replete with experiments on educational improvement. Yet, making sense of the results of those experiments has been a difficult task for policymakers. Likewise, local successes do not easily extend to larger arenas. As with many other policy issues that social and behavioral scientists confront, education is an arena in which everyone feels qualified to play. The result is frequent and spirited controversy among contending ideas, but no practical way of distinguishing between them.

The federal government plays a significant educational role in providing assistance to states and localities through grants and programs and by supporting the conduct of research and the collection of data. In higher education, the federal government primarily provides grants, loans and fellowships for students. The major laws – the Elementary and Secondary Education Act and the Higher Education Act – have become mainstays of policy. Each reauthorization, which occurs every five years or so, gives decision makers another opportunity to scrutinize the literature and adjust their perceptions of how to do things better.

Myriad disciplines, agencies, foundations, and other organizations have produced a bewildering array of ideas, findings, and programs. Some of this diversity is rooted in different perspectives regarding the purpose of schools. As the role of public education has evolved to meet the multiple needs of a modern society, some view schools as purely learning institutions, others as child development centers, and still others see them from the economic utility perspective as worker production factories. Another conception defines the purpose of education as helping students develop the necessary intellectual tools and learning strategies to acquire knowledge that allows people to think productively about many subjects.

Behavioral and social scientists have tried to deal with these differences by developing frameworks for thinking about education that addresses the problem at many levels of analysis. These include the individual child's brain and mind, the cultural context in which he or she develops, the school, the community, and where the community is situated. Advances in the areas of cognition, social development, human evolution, culture, and educational practices are all helping educators and parents provide for the growth and opportunity of young people.

The Pre-School Years

Learning begins quite early; getting children off to a good start in life is, therefore, a key to that learning. Both the Clinton and Bush administrations have recognized this and have convened White House summits on child development and early childhood learning. Getting off to a good educational start is predicated on a number of factors identified by research in the neurobiological, social, and behavioral sciences. There is a considerable body of research that has focused on children from birth to age five, summarized in the National Academies of Science report, *From Neurons to Neighborhoods: The Science of Early Childhood Development,* which details the highly interactive influence of genetics and environment on the development of the brain and the unfolding of human behavior.

The report also focuses on the central role of early relationships as a source of either support and adaptation or risk and dysfunction. The research demonstrates that powerful capabilities, complex emotions, and essential social skills develop in the earliest years of life. Planned interventions, the research makes clear, can also increase the odds of favorable developmental outcomes. Cognitive research has shown that stimulating children in their early years is important in brain development. The importance of reading for success in school has also been demonstrated, and it has been shown to help at-risk students become more resilient. President Bush has clearly understood this both in Texas and now at the national level.

In addition, the report indicates that the examination of the kinds of households, neighborhoods, and income levels under which children are reared can impact learning and development. The nature of work engaged in by parents of young children and the corollary issue of quality day care, continued high rates of poverty among certain segments of the population, the persistent racial and ethnic disparities in health, and the stresses on young children sometimes make it more difficult for every child to get a healthy start. These may seem like common sense observations, but verified by the techniques of the social sciences they are more easily legislated into support programs or implemented by school districts and states.

Helping children before they reach school age is the strong implication of the research on early childhood. Policymakers responded to this challenge as early as the mid-1960s when the research of Ed Ziegler of Yale and his colleagues led to the creation of the Head Start program. After some initial disappointments in the short-term effects of this program, more recent research has demonstrated the positive long-term impact on the children who participated. Research has shown, for example, that Head Start generates long-term improvement in school attainment, future earnings, and crime reduction.

Research has also demonstrated that poor diets and reduced access to medical care affect learning prospects and have long-term consequences. The federally supported Women, Infants, and Children program and the more recently enacted State Children's Health Insurance program were policy responses to these findings. More recent responses include additional proposals to get children ready to learn, such as providing quality pre-school and after-school activities for all children.

How People Learn

Behavioral and social science research has also informed the learning process. These contributions are discussed in the National Academy of Sciences report, *How People Learn: Brain, Mind, Experience, and School*. Cognitive psychologists have increased understanding of the principles of knowledge organization that underlie people's abilities to solve problems in a wide variety of areas, including mathematics, science, literature, social studies, and history. Development researchers have shown that young children understand a great deal about basic principles of biology and physical causality making it possible to create innovative curricula that introduce important concepts for advancing reasoning at early ages. Research on learning and transfer has uncovered important principles for structured learning experiences that enable people to use what they have learned in new settings. Work in social psychology, cognitive psychology, and anthropology is making it clear that all learning takes place in settings that have particular sets of cultural and social norms and expectations and that these settings influence learning in powerful ways.

In addition, cognitive research indicates that children are always ready to learn. They are irrepressibly curious, they are problem solvers, they gain insight into their own learning capabilities, and they try to make sense of their worlds. But they need help. According to the report, "adults play a critical role in promoting children's curiosity and persistence, by directing children's attention, structuring their experiences, supporting their learning attempts, and regulating the complexity and difficulty information for them."

Learning to Read

We have learned much over the last 40 years in understanding how children learn to read and how reading affects development of other areas of their learning. Great progress has been made in understanding what we might call "the science of reading." Much of this work is summarized in the recent National Research Council report, *Preventing Reading Difficulties in Young Children*, and the National Reading Panel report, *Teaching Children to Read*.

The NRC panel indicated that learning to read is a lengthy process that begins early in life. It therefore stresses the importance of access to early childhood environments that promote language and literacy growth. In assessing the research, the Reading Panel stressed that phonemic awareness (the ability to recognize and manipulate two sound words); phonics instruction (which helped early readers, but not the later acquisition of comprehension skills); guided repeated oral reading, age-appropriate vocabulary instruction; and formal instruction in comprehension strategies are useful for teaching children to read. It was also found that reading instruction works better when combined with writing instruction. A critical and overriding factor, however, was motivated teachers as well as motivated students.

PET / fMRI: NEUROIMAGING

In the last decade or so, rapidly evolving neuroimaging techniques are revolutionizing the scientific and medical knowledge of the human brain and helping cognitive scientists understand the links between brain and behavior. Scientists and engineers have developed a wide range of these techniques that measure brain function and anatomy. Positron Emission Topography (PET) and functional Magnetic Resonance Imaging (fMRI) are two tools that have helped comprehend brain activity.

The functional neuroimaging methods are used to test hypotheses about the location, duration, and sequence of elementary information processing operations that compose the systems that support particular brain and psychological processes. Thus, activity throughout the whole brain can be assessed simultaneously, rather than from a single or small number of single cell recordings. These techniques can be used to provide relatively non-invasive hypothesis tests across a wide range of cognitive, emotional, and motor functions in human beings.

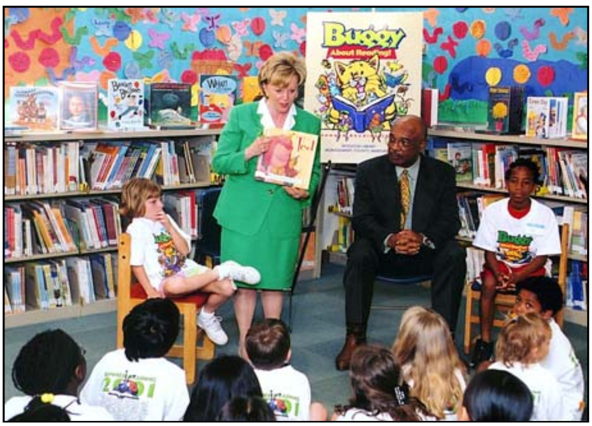
The anatomical neuroimaging methods can be used to assess changes in brain structure (brain plasticity) in specific individuals over time (with age, learning, disease, etc.) and across individuals of different genetic structure, health and disorder, sex, and degree of mental capacity.

These new techniques can contribute to scientific understanding of human behavior by providing: data on the separability of cognitive, affective, and social processes; an opportunity to assess the behavioral consequences of brain damage that helps to gain insight into normal processing; the ability to see the overlap in brain structures that are recruited from one or another cognitive, affective, or social function; knowledge of the neural basis of psychological processes that help study the effect of experiential and maturational factors on development; increased understanding of the nature of cognitive, affective, and social functions; and comparisons with data ►

from animal laboratory studies that allow assessments of the validity of comparative animal models for human behaviors.

Michael Gazzaniga of Dartmouth College has received National Science Foundation and other funding to create the fMRI Data Center to provide a common set of brain images for researchers to utilize (*www.fmridc.org*).

Linguist William Labov has also noted that learning to read English is more difficult than learning to read other languages. He indicates that the alphabet was created for languages with five vowel sounds, compared with the 16 vowel sounds of English. In addition, the English language has borrowed vocabulary patterned from several different languages, from French to German to Hindi, which complicates the "sound-to-spelling rules" crucial in learning to read.



Education Secretary Rod Paige and Mrs. Lynne Cheney read to children, kicking off a summer reading program.

Source: U.S. Department of Education

Multilingualism

An issue that that has emerged with full force over the last two decades is multilingualism. Available data indicate that many more people speak two or more languages than speak only one. In addition, many more children throughout the world have been and continue to be educated via a second or a later-acquired language, at least for some portion of their formal education. In many parts of the world, bilingualism or multilingualism and innovative approaches to education that involve the use of two or more languages constitute the normal everyday experience. Within this domain, social science research, including studies of second generation Hispanics and Asians by Alejandro Portes of Princeton University, and Min Zhou of the University of California at Los Angeles, has helped us understand the role of language in education within linguistically diverse communities.

The data from various sources lead to a number of relatively straightforward conclusions:

- The language of school is *very* different from the language of home

- The development of cognitive/academic language requires time (four to seven years of formal instruction)

- Individuals most easily develop literacy skills in a familiar language

- Individuals most easily develop cognitive skills and master content material that is taught in a familiar language

- Cognitive/academic language skills (once developed) and content-subject material (once acquired) transfer readily

- The best predictor of cognitive/academic language development in a second language is the level of development of cognitive/academic language proficiency in the first language

- Children learn a second language in different ways depending upon their culture, their group, and their individual personality

Therefore, if the goal is to help the student develop the highest possible degree of content mastery and second-language proficiency, time spent instructing the child in a familiar language is a wise investment. The results from published, longitudinal, and critical research undertaken in varied settings throughout the world indicate clearly that the development of multiple language proficiency is possible, and indeed that it is viewed as desirable, by educators, policy makers, and parents in many countries.

CHILDES: Child Language Data Exchange System

The Child Language Date Exchange System (CHILDES) is an international database organized for the study of first and second-language acquisition. The database has been donated to the language community from over sixty major projects in English and additional data from many other languages. Along with data from normally developing children, there are data from children with language disorders, adult aphasics, second-language learners, and early bilinguals. It also contains a wide variety of language samples from a wide range of ages and situations.

In essence, the database is a set of transcripts of conversational interactions. Almost all of the data represent real spontaneous interactions in natural contexts. There are computer programs that search and manipulate the database and a standard transcription format for researchers to use that accommodates a large variety of levels of analysis.

CHILDES has led to the publication of over 1,300 research studies in the areas of language disorders, aphasia, second-language learning, computational linguistics, literacy development, narrative structures, and adult sociolinguistics.

Brian McWhinney of Carnegie Mellon and Catherine Snow of Harvard collaborate on directing the project. The database is available at *http://childes.psy.cmu.edu*.

Schools and Teachers

The structure and environment of schools and the people who administer and teach in them are important parts of the nation's education system. The release in 1966 of *Equality of Educational Opportunity* by James Coleman accelerated the debate on the aspects of schools that matter in a child's education. The report suggested that the structure and resources of schools were not as important as family resources and the population makeup of other students in the school. This reinforced and accelerated the movement to desegregate schools.

David Grissmer of RAND recently analyzed the impact of school resources on National Assessment of Educational Progress (NAEP) data and indicated that targeted state resource allocations do have an impact on school performance.

Coleman's subsequent research, verified by others, established that private schools, particularly parochial schools, fostered greater achievement for black and Hispanic students. This has fortified support for public aid for private schools and has led the Supreme Court to reinterpret church-state separation clauses of the first amendment to the Constitution.

Clearly, schools differ throughout the country. Funding inequities among schools have led to court cases forcing states to develop school funding equalization plans. As New Hampshire, for example, continues to demonstrate, these are not easy. In addition, research has demonstrated the under-preparedness of our teachers. Many lack subject area expertise, particularly in science. This has led to legislation, such as the Eisenhower Professional Development program, supporting more teacher training and development.

One issue that has been part of the policy debate in recent years is class size. The most famous examination of this issue is the Student Teacher Achievement Ratio (STAR) study from Tennessee. The study originally found that in kindergarten through the third grade, students in smaller classes performed better on standardized tests than their counterparts in larger classes. In April 1999, STAR researchers reported that students placed in small classes in grades K-3 have better high school graduation rates and higher grade point averages and are more inclined to pursue higher education. In an independent study, Princeton economist Alan Krueger confirmed these findings. However, the impact of teachers still seems to count more in studies done by other scholars such as Eric Hanushek of Stanford and the Hoover Institution.

School Reform

Currently, there is a major effort to reform our nation's schools. Both the National Science Foundation and the U.S. Department of Education are funding comprehensive and systemic reform efforts. The Department of Education's Office of Educational Research and Improvement has identified over 35 school-wide reform models as well as many more that focus on specific subjects such as reading, math, or science. Experiments are being conducted all over the country with different types of structures, curricula, teaching arrangements, etc. The charter school movement, the privatization of some schools, and the issue of school choice, including vouchers, are a major part of the education policy scene. Programs such as Success for All developed by Robert Slavin of Johns Hopkins University and his colleagues, and the School Development Program devised by James Comer of Yale University, provide school-wide compensatory education for disadvantaged youth. The programs were built on a solid, multi-disciplinary foundation of research and evaluation and provided the stimulus for the comprehensive school reform movement. Social scientists have conducted preliminary evaluations of many of these experiments. There are indications that some progress has been made, but long-term effects will need further study.

During the past ten years the primary effort has been standards-based systemic reform that posits that all students can learn to much higher levels and that high common standards can help produce such learning. Given the impetus of articles by Stanford's Marshall Smith and Jennifer O'Day in the early 1990s, systemic reform became a major initiative at the National Science Foundation and in many states. It also fostered the development of standards for curricula in science, mathematics, geography, history, and other subjects. The Center for Policy Research in Education (CPRE) has tracked standards-based reform efforts throughout the United States. Susan Fuhrman, CPRE's Director, has noted the difficulties states have in implementing many of these reforms because of their need to: develop technical capacity; build public, political, and professional support; design policy capable of promoting and integrating complex reform components; provide adequate financial resources; and conduct sophisticated research. The offshoot of this reform effort has been the accountability movement, which is seeing its full fruition in the current reauthorization of the Elementary and Secondary Education Act.

Few issues have stirred more controversy in education policy in recent years than that of school choice. Milton Friedman made the economic argument for school choice many years ago while at the University of Chicago. Political scientists John Chubb of the Brookings Institution and Terry Moe of Stanford have contended that giving parents the right to choose their children's schools will greatly increase the efficiency of schools, boost student performance, and improve the overall quality of American education. At the theoretical center of this debate is the reasoning of neoclassical microeconomics and market theory. In addition, social science theories of social networks and the role of intermediaries help parents make informed choices.

Although choice experiments abound, long-term evaluations are not yet available. A number of other questions need answering: Do students whose families have exercised choice have better educational outcomes (e.g., lower dropout rates) than those who do not? To what extent are these outcomes a function of parent involvement with school activities? To what extent are these outcomes a function of the quality of the match between parent preferences and school characteristics?

Assessment and Accountability

The latest reauthorization of the Elementary and Secondary Education Act focuses mainly on accountability questions. This is an elevation to the national level of a phenomenon that has pervaded the states for over ten years. Virtually every state and thousands of school districts have developed tools of accountability that assess student achievement and school success. Susan Fuhrman, head of CPRE and Dean of the Graduate School of Education at the University of Pennsylvania, has noted that the new accountability approaches focus on the school as the unit of improvement with more consequences attached to performance levels.

One of the difficulties with accountability is how to measure performance. For example, the proposed legislation uses the concept of "adequate yearly progress" as an accountability measure. However, Thomas Kane of Stanford and UCLA, Douglas Staiger of Dartmouth, and Jeffrey Geppert of the National Bureau of Economic Research have suggested that the concept as defined by the legislation would create difficulties for many school districts inadequately prepared to meet these guidelines.

President Bush's proposals have focused on annual testing as the key to educational improvement. For years the U.S. Department of Education has used the National Assessment of Educational Progress (NAEP) as a tool to assess educational attainment in various subjects. The contributions of psychometricians, statisticians, and others in developing the NAEP sampling design, and those of social scientists who developed item response theory, provide scientific inferences on a wide range of topics based on a test administered to a relatively small random sample of students.

In addition, international assessments such as the Third International Math and Science Study (TIMSS), which reflected the poor international ranking of U.S. primary and secondary school students, led many to question the quality of our schools and their teachers. Research by William Schmidt of Michigan State and his colleagues is attempting to explain the drop off in scores, compared to other nations' students, from fourth to eighth and then from eighth to twelfth grades. Comparative studies of American, Japanese, and German school systems undertaken by Harold Stevenson of Michigan and videotapes from TIMMS analyzed by James Hiebert of the University of Delaware indicate differences in teaching style and curricula that appear to place American students at a disadvantage. These policy relevant international achievement comparisons have been made possible because of advances in psychometrics and the development of relevant indicators of educational achievement.

Finally, the National Academy of Sciences has warned in its report, *High Stakes: Testing for Tracking, Promotion and Graduation* that better evidence is needed on the intended benefits and unintended negative consequences of using of high stakes tests to make decisions about individuals needs.

Higher Education

One of the goals of the past half-century of American educational policy has been to increase every person's access to higher education. The Cold War generated the impetus for enactment of the National Defense Education Act in 1958 and its aim of producing a more highly educated population. Also, the belief that the development of "human capital" was a primary engine of economic growth and productivity further underscored the importance of higher education. The act helped produce a generation of scientists, scholars, and teachers that helped America's higher education system become the envy of the world.

Of equal significance was the Higher Education Act, first enacted in 1965. This established a system of student financial aid that has evolved over the years. Grants, loans, and work-study programs were promulgated to help the sons and daughters of poor and middle-class Americans reach college and graduate school.

The programs that were established as a result of these laws have undergone review and renewal. During these reviews the input of social scientists has been considerable. Scholars such as Jacqueline King of the American Council of Education have examined student aid issues such as access, need-based versus merit-based aid, the increase in student loan indebtedness, and the labyrinth of for-profit and nonprofit companies and organizations that administer student loans.

In recent years, the issue of escalating college tuitions has also caught the eye of many lawmakers. Ronald Ehrenberg of Cornell, Charles Clotfelter of Duke, and others have explored why these increases have occurred and suggested that the cost of college rises for many different reasons – the increasing cost of faculty, facilities, compliance with regulations, and scientific equipment to keep our major research universities in the forefront of cutting edge research.

Also drawing the attention of policymakers is the course and curriculum content in our nation's colleges and universities. Clifford Adelman of the U.S. Department of Education has conducted a number of studies of student course selections and changes in requirements over time. In addition, there is increasing concern over why American students are drifting away from science and engineering careers. Elaine Seymour of the University of Colorado and Nancy Hewitt of Rutgers have, for example, explored why so many U.S. students drop out of science courses during their college careers. In interviews with college students they discovered intense criticism of introductory undergraduate science courses that are perceived as deliberatively competitive and designed to overwhelm them and weed them out. Scholars including Mary Frank Fox of Georgia State University and Scott Long of Indiana University have investigated the processes, starting in graduate school, that have resulted in even fewer women than men having successful scientific careers.

Other issues that social scientists have explored are how elite schools affect the future earnings potential of their students, the flow of faculty (particularly retirement patterns), and the numerous speculative studies on the future of the university, particularly in light of the growing popularity of distance learning and specialized for-profit challenges from the private sector. Finally, each year for the past 35 years Alexander Astin and his colleagues at UCLA have surveyed first-year college students on their attitudes and aspirations.

The Future

Two core problems of education research need investigation: 1) understanding how to create schooling environments where general research utilization becomes embedded professional practice; and 2) incorporating recently developed knowledge of cognition into teaching practice and curricula design.

With the increasing use of information technology as a pedagogical tool, educators are eager to know how well it is all working. The President's Committee of Advisors on Science and Technology (PCAST) in March 1997 issued, *Report to the President on the Use of Technology to Strengthen K-12 Education in the United States.* The PCAST report recommended significant infusion of federal funds to perform educational research, particularly on technology and its effects in the classroom and on student achievement.

Many view the area of student motivation as the missing component of policy-relevant knowledge of students' learning. The National Research Council report, *Improving Student Learning*, identifies research on motivation as essential to improved teaching and learning. This is an area that calls for a multi-disciplinary approach examining issues of personal identity, social structure, and academic programs. The National Academy of Sciences, in cooperation with the Carnegie Corporation of New York, has launched a committee to examine research related to the academic engagement and motivation of urban youth. In addition, further studies of teacher motivation are also on the agenda.

Research on reading will continue. The RAND corporation is undertaking a major longitudinal study of reading comprehension. Further research on how students learn other subjects, such as math, science, history, and others, is also part of the agenda.

Further studies of resource allocation questions are also necessary. There are some indications that targeted resource increases appear to result in substantial increases in achievement. Researchers need to further examine this issue from a microeconomic point of view, and in the context of the changing resource base and long-standing school finance issues.

As the U.S. becomes a more diverse society, social and behavioral scientists will continue to investigate the role of schooling in overcoming (or failing to overcome) racial and ethnic inequalities. These scientists will also look at the processes that result in fewer women and minorities having successful scientific careers.

Finally, social and behavioral scientists will continue to examine the long-term impact of comprehensive and systemic school reform. The many experiments march on and they need evaluation.

7. PROMOTING FAIRNESS

The 14th amendment to the U.S. Constitution guarantees equal opportunity for all citizens. But because democracy is an imperfect, constantly evolving process, discrimination based on race, gender, age, religion, disability, and sexual orientation remains a persistent fact in American life. That is why the legal system regularly uses data, information, and insights from the social and behavioral sciences.

One important policy landmark in the battle against discrimination was *Brown v. Board of Education* (1954), in which the Supreme Court declared racially segregated schools to be unconstitutional. Then came the Civil Rights Act of 1964, the Voting Rights Act of 1965, and the Fair Housing Act of 1968. Collectively, these decisions and laws barred various forms of racial discrimination in employment, public accommodations, voting, and housing. In the meantime, significant progress has been made in bringing additional judicial and legislative protections for women, minorities, the aged, the disabled, and at least in some localities, homosexuals.

President Johnson signs the Civil Rights Act of 1964.

Photo by O.J. Rapp; Source: Lyndon Baines Johnson Library

Social science research nurtured all of these gains directly. A cogent example is Thurgood Marshall's role in leading the NAACP Legal Defense Education Fund's campaign to end segregation through constitutional litigation. Marshall relied on scholars on Howard University's Law School faculty for his initial efforts in this battle. Incorporating insights from these legal scholars, Marshall introduced social science testimony detailing the ill effects of segregation in his challenges to segregated schools. Kenneth Clark's study of the psychological impact of segregation on schoolchildren was especially critical in making the argument against segregation.

Since that case, literally thousands of social science and legal studies have broadened our understanding of equality and led to advances in fairness. The studies range from theoretical works, such as analyses of different voting structures, to the many "tester" studies documenting discrimination in housing, employment, car sales, bank loans, and other situations.

In addition, social science research from the General Social Survey and other systematic data collections has provided evidence tracking racial attitudes in light of these legislative and judicial changes. The studies have demonstrated an increased racial and religious tolerance, highlighted most recently by the 2000 presidential campaign in which Democratic Vice-Presidential candidate Joseph Lieberman's expressions of his faith in Judaism did not raise the same problems that John F. Kennedy's Catholicism did in 1960.

Social science work has been essential, not only in fueling judicial challenges like those mounted by Marshall, but in giving theoretical and empirical insights to legislative, administrative, and societal debates over social inequalities. Examples include evidence supporting the Age Discrimination in Employment Act, the Americans with Disabilities Act, and the Family and Medical Leave Act. State legislators and administrative regulators at all levels likewise consult social science evidence before adopting rules on issues before them.

Social science research has even raised questions about the meaning of equality itself. Ongoing research on gender equality, for example, has shifted our societal focus from straightforward questions of whether women are treated "the same as" men to whether social structures themselves favor men. This work has been essential to understanding how pregnancy and childbirth are treated in the workplace, under insurance plans, and in other contexts. Similarly, scholars have demonstrated that "women of color" experience discrimination differently than either non-white men or white women, significantly broadening our understanding of equality and difference.

The Legal System

A considerable amount of research has been done that is directly as well as indirectly relevant to fairness in our legal system. By the early 1970s a large body of research on crime suggested that effective crime control required a more equitable system of justice. Especially troubling were the findings that the justice system treated women and blacks differently from men and whites. Social science researchers documented their employment experiences, the responses to their victimization, and how they were processed through the system This encouraged society to address these conditions and led to changes in employment and police practices, new sexual assault laws, changes in investigational guidelines, enhanced police response to domestic violence, and dramatic changes in sentencing practices.

"Equal Justice Under Law," reads the inscription on the front of the U.S. Supreme Court.

Photo by Chris Ryan, COSSA

Another strand of this literature on fairness in the legal system has focused on the jury system. The groundbreaking book in this tradition is the sweeping study, *The American Jury* (1966). This ambitious investigation of jury decisionmaking by two University of Chicago law professors, Harry Kalven and Hans Zeisel, substantially advanced our understanding of the jury as an institution and of the various factors that influence the jury process. According to Valerie Hans of the University of Delaware and Neil Vidmar of Duke University Law

School, this study has been cited in 21 U.S. Supreme Court decisions (most of them death penalty cases), 38 federal appeals court opinions, and 79 state appellate court opinions. These citations include references to the study's findings on a wide range of issues, from the influence of extralegal factors such as race discrimination on jury decisions, to jury size and jury nullification. The study also launched the contemporary field of jury studies, which continues to have important impacts. Some researchers have addressed the potential biases in the jury system and jury selection in particular. Others have focused on the structural and informal mechanisms, such as using voter registration rolls to identify prospective jurors, that may lead to racial discrimination in the jury system. This work has encouraged state and federal jury managers to put together more representative jury pools.

Another research tradition examines the potential for miscarriages of justice in police investigation practices. For example, Gary Wells of Iowa State and Elizabeth Loftus of the University of Washington have compiled an overview of the myriad difficulties of using eyewitness identifications and line-ups as evidence in criminal trials. Wells has produced a manual that documents procedures that are likely to produce erroneous findings from eyewitness identification. Many states are adopting practices based on his findings and recommendations.

Beyond these eyewitness testimony issues, Richard Leo of the University of California at Berkeley extensively studies police interrogation practices that are likely to lead to false confessions. Additionally, Joe Cecil of the Federal Judicial Center and his colleagues have summarized the literature on the appropriate uses of forensic DNA evidence.

In 1994, working with scholars who study law and society, the Federal Judicial Center assembled a manual designed to help judges manage and evaluate expert testimony around scientific and technological issues. Cases ranged from toxic substances and product liability litigation to criminal cases. A particularly influential entry was Northwestern University Law School professor Shari Diamond's analysis of survey research methods including guidelines for evaluating sampling procedures and reasons why control groups are important.

Much of this research relating to fairness in the judicial system and potential miscarriages of justice is explicitly oriented toward policy enhancement. Future research is likely to focus on issues of prosecutorial discretion, one of the most critical and under-researched dimensions of legal outcomes.

Reducing Workplace Discrimination

Reducing workplace discrimination goes beyond an employer simply saying it is wrong. As helpful as admonishments and legal remedies can be, enhancing equity and fairness in the workplace requires understanding the processes that elicit, maintain, and modify discrimination – from the nature of stereotyping to interpersonal communication to inter-group dynamics.

Sociologists and economists have investigated three types of policies to overcome inequality in the workplace. These are affirmative action policies, pay equity, and work family policies. Social science researchers such as sociologist Barbara Reskin of Harvard University and economist William Darity of the University of North Carolina at Chapel Hill have found that while only a small portion of U.S. employees are governed by affirmative action mandates, they do (when implemented and monitored) reduce discriminatory barriers still faced by minority and female workers and do not have significant negative effects for men and for racial majorities.

Issues of pay equity and comparable worth joined the ranks of social controversies about equality in the workplace during the 1980s. Those who supported the claim of equal pay for work of comparable value, as well as those who did not, looked to sociologists and economists such as Joan Acker of the University of Oregon, Ronnie Steinberg of Vanderbilt University, and Heidi Hartmann of the Institute for Women's Policy Research to analyze pay and compensation levels for occupational systems to see if they were equitable. Court decisions have been divided about whether comparable worth cases are covered under the Equal Pay Act of 1963 or the Civil Rights Act of 1964. During the 1990s, Congress introduced and debated, but has not as yet passed, remedial legislation.

Sociologist Arlie Hochschild's pathbreaking study on work and family showed that, in the absence of corporate and public policies that facilitate the multiple roles of parenting and paid work, the unequal division of labor between men and women in dual-earner households results in a "double day for women." Heidi Hartmann and Roberta

Spalter-Roth, then of the Institute for Women's Policy Research, showed the cost-benefits of policies such as child-care and family and medical leave. Congress responded by enacting the Family and Medical Leave Act (FMLA). signed into law by President Clinton. About half the workforce qualifies for this policy, and later studies undertaken under the auspices of a White House-appointed Commission, found that the costs to business of this policy were small. Linda Waite of the University of Chicago, Phyllis Moen of Cornell University, and Barry Fraser of the University of California at Berkeley are further examining the need for and impact of work/family policies under the auspices of the Alfred P. Sloan Foundation.

More specifically, social and behavioral scientists have used controlled experiments to demonstrate that a person's looks matter in hiring practices and salaries, depending on the type of job to be filled. But good looks, depending on the job, are more important for women than for men. In addition, male communication style rates higher than female communication style as an indicator of job competence.

Research also has shown that race/ethnicity, disability, sexual orientation, age, and even accented speech all influence the evaluation and perception of job applicants. While diversity training can play a key role in reducing discrimination in all of its forms, some research indicates that instructions to suppress stereotypic thoughts may in certain circumstances have detrimental effects on evaluations of non-traditional job applicants. Other work shows that the degree of resentment felt by white males passed over for a woman or person of color depended on the reasons given for the decision. Using the results of rigorous behavioral science research should foster the development of workplace and policy interventions to remedy discrimination.

The federal government's administration and enforcement of the Equal Employment Opportunity Act led social scientists to continue to explore the development of policy and the changing legalities related to sexual harassment. As early as the late 1970s, researchers identified sexual harassment as a serious impairment to women in the workplace. By the 1980s social scientists were discussing the effects of this condition, reinforced by the hearings over the nomination of Clarence Thomas to the Supreme Court. The Federal Government's policy and practices continue to unfold, especially in light of new research, including studies on the sexual harassment of men.

Research has identified specific communicative practices – minimizing or ridiculing complaints, isolating targets, rationalizing or excusing harassers' behavior – that allow, condone, or legitimize sexual harassment in the workplace. Corrective measures that have been identified include both individual actions to stop sexual harassment (e.g., communication tactics to challenge or stop harassment) and changes in institutional structures, policies, and normative practices (e.g., revising training and grievance policies, eliminating sexist and sexualized language in the workplace) so that harassment is less likely to occur or be tolerated by the community.

A second line of research relevant to reducing workplace discrimination investigates ways of overcoming communication barriers among people of different backgrounds and disabilities. For instance, communication scholars have developed guidelines to help organizations (and the employees who comprise them) become more inclusive of people who have diverse ethnic heritages, including those for whom English is a second language. Research has also provided practical guidelines that organizations can use to implement and comply with the Americans with Disabilities Act.

Expanding the Right to Vote

The Voting Rights Act was the key catalyst in extending the right to vote to those Americans who were clearly discriminated against in earlier times. Numerous social science studies identified the many methods used to keep voters from going to the polls.

Since the disputed Florida results in the presidential election of 2000, research interest has focused on such access-to-voting issues as making registration easier, avoiding voting machine breakdowns, ballot design, and perceived intimidation effects. Research on voter registration by Ray Wolfinger of the University of California at Berkeley and others spurred policymakers to enact the Motor Voter Act, which has made registration simpler. Social scientists continue to study how to induce already registered voters to actually vote. Additionally, social scientists are also conducting research on new methods of voting, such as the expanded use of absentee ballots, the nationwide applicability of Oregon's experiment in all-mail elections, and the potential for voting via the Internet.

ANES: THE AMERICAN NATIONAL ELECTION STUDY

The American National Election Study (ANES) conducts national surveys of the American electorate in presidential and midterm election years and carries out research and development work through pilot studies in odd-numbered years. The ANES time-series now encompasses 23 biennial election studies spanning five decades. The longevity of the ANES time-series greatly enhances the utility of the data, since measures can be pooled over time, and both long-term trends and the political impact of historical events can be identified.

In presidential election years, the study is conducted both before and after the election (pre- and post-election), while in congressional election years the study is conducted only after the election (a post-election study). Each study addresses a wide range of substantive themes including: expectations about the election outcome; perceptions and evaluations of the major parties and their candidates; interest in the campaign; information about politics; partisanship; assessments of the relative importance of major problems facing the country; attention to campaign coverage in the mass media; feelings of political efficacy; political values; conservatism versus liberalism; trust in government; political participation; vote choice; economic well-being; positions on social welfare, economic, social, and civil rights issues; evaluations of a wide range of political figures and groups; detailed demographic information; and measures of religious affiliation and religiosity.

The study's website is *www.umich.edu/~nes*.

Housing Segregation

The degree of housing segregation for blacks is so high that it has been described by sociologists Douglas Massey of the University of Pennsylvania and Nancy Denton of the University of Albany as hyper-segregation, and is seen as the result of interrelated processes. High levels of institutional discrimination in the real estate and banking industries reflect the public policy that enforced racial segregation in housing until the Equal Housing Act of 1968, the current lack of enforcement of this Act, and high levels of racial prejudice. The results of the hyper-segregation of blacks were found to be poorer public education, lack of networks of contacts for jobs, mismatch between location of jobs and location of housing, and heightened crime rates.

Congress passed the Fair Housing Act of 1968; the Equal Credit Opportunity Act of 1974 (which prohibited racial discrimination in mortgage lending); and the Home Mortgage Disclosure Act (which required the disclosure of race, gender, and income of applicants, the census tract location of homes, and the outcome of the transaction [acceptance or denial of application] from mortgage lenders). Congress also passed the Community Reinvestment Act of 1977 to overcome redlining in minority neighborhoods. Yet, as sociologists John Yinger of Syracuse University, and Reynolds Farley of the University of Michigan have shown that, though now illegal, it is still common practice to use residential steering by real estate companies to prevent settlement of blacks and Latinos in their place of choice. As a result of limited enforcement, mortgage lending practices still have disparate impact.

Language Rights

Language rights is another area where social and behavioral research has had an impact. In the beginning of the twentieth century, American linguists were heavily involved in describing Native American languages, many of which were in danger of extinction. Those efforts not only documented many languages that are no longer spoken, thus preserving an important part of the heritage of this continent, but they also laid the groundwork for more current efforts to preserve or reinvigorate indigenous American languages that are still spoken. On a policy level, these efforts are reflected in the Native American Languages Act, which officially ended a long government campaign to eradicate native languages. Although all Native American languages remain endangered, there is now hope that some may survive.

The increasingly diversified population of the U.S. has intensified debate over the position of English in American society. Many immigrants no longer feel the need to learn English, and that has

GSS: THE GENERAL SOCIAL SURVEY

The National Data Program for the Social Sciences (General Social Survey), begun in 1972 and funded by the National Science Foundation, is both a data diffusion project and a program of social indicator research. Its data collection instrument, the General Social Survey (GSS), was fielded for the 23rd time in 2000. Previously an annual survey, the GSS became biennial in 1994. The questionnaire contains a standard core of demographic and attitudinal variables, plus certain topics of special interest selected for rotation (called "topical modules").

The basic purposes of the GSS are: to gather data on contemporary American society in order to monitor and explain trends and constants in attitudes, behaviors, and attributes; to examine the structure and functioning of society in general as well as the role played by relevant subgroups; to compare the United States to other societies for comparative perspective and to develop cross-national models of human society; and to make high-quality data easily accessible to scholars, students, policy makers, and others, with minimal cost and waiting.

Survey items have included national spending priorities, drinking behavior, marijuana use, crime and punishment, race relations, quality of life, confidence in institutions, and membership in voluntary associations. In the 2000 survey the topical modules examined freedom, Internet use, multiculturalism, national security, health status, and religion. The international module focused on environment and social inequality. The GSS website is *www.norc.uchicago.edu/gss/homepage.htm*.

prompted legislative efforts to protect English as a common language. Twenty states have already made English their "official" language. There have been similar, albeit unsuccessful, efforts to declare English as the official language of the United States. However, research has shown that the vast majority of immigrants pass through roughly similar transitions to English, where the first generation is dominant in the native language, the second is bilingual, and the third is dominant in

English. If anything, this trend has accelerated over the years. There is thus little reason to fear that Spanish, Chinese, Urdu, or any other language will eclipse English in the United States.

Dialect Diversity

The study of dialect diversity, or variation within language, has led to important insights into the nature of language structure and the role of language differences in society. The detailed examination of a wide array of social and ethnic vernacular dialects in English over the past half-century has demonstrated that dialect diversity is highly systematic and patterned, regardless of its social valuation.

Major public controversies that have arisen in recent decades, including those centered on language "correctness," language "deficits" versus "differences," and the role of dialects in the acquisition of educational skills have reflected how we cope with dialect diversity. For example, the detailed examination of vernacular dialects such as Ebonics (African-American vernacular English) and Appalachian English, among others, has shown that the structures of these varieties are not the result of careless speech habits or fundamental language deficiencies but are derived from systematic language change and variation. Explanations for diversity are grounded in the history of language contact, the diffusion of language change over time and space, and the social and psychological dynamics associated with various social and ethnic groups in society. The nature of dialect diversity is also dictated by the structure of the human mind and the way in which it organizes and processes language.

Information about language differences bridges into humanities studies and has been applied to a number of educational venues, including language assessment, literacy, and language arts. Knowledge about dialect differences can aid in developing literacy skills, although research is still needed to determine the precise ways in which dialect diversity impacts the literacy process. Finally, there is a continuing need to educate the public about the natural and inevitable diversity of language through formal and informal education.

The Future

Much research related to fairness remains to be done. Almost half a century after *Brown v. Board of Education*, empirical studies continue to show marked race and gender differences in employment, education, and other indicators. Increasing sophistication in gathering and analyzing data has allowed us to demarcate more clearly the channels of discrimination, while advances in theory have refined the questions we ask. Researchers are also increasing investigations in other forms of discrimination, such as biases based on age, disability, and sexual preference.

At the same time, future research is expected to address at least four growing areas of concern. First, we must focus our inquiries to look more closely at economic inequality itself. Although discrimination based on race and sex declined dramatically during the last fifty years, the gap in income and wealth between rich and poor widened substantially. We need continued research by social scientists to help us understand this conundrum and address it. Second, our aging population will raise fairness issues in new contexts, and will render those questions particularly acute. What proportion of our societal resources should be allocated to medical care during the last years or months of life? Who should bear the burdens of long-term care for the aged? How will public programs – and resources for those programs – change as the percentage of full-time workers in our adult population decreases?

Thirdly, the global economy is generating fairness issues of its own. Is it fair for countries to reject goods produced under conditions that would be illegal in their own nations – or is that an unfair form of trade discrimination? What if the objectionable conditions arise from deeply rooted religious or cultural differences? What is “fair” trade and “fair” employment in a global economy? Research by lawyers and other social scientists will shape this debate at both theoretical and empirical levels.

Finally, as we learn more about human variability from genetic research and our nation becomes increasingly pluralistic and multi-racial, what will this mean for race relations in this country?

8. PROTECTING THE ENVIRONMENT

Protection of the natural environment may seem at first glance to be a matter mostly for the natural sciences rather than the social sciences. Yet, social and behavioral scientists have actively investigated many aspects of environmental protection including commons management, natural resources management, and others. This chapter focuses on two other aspects: the human dimensions of global environmental change and regulatory policies.

For the first, social and behavioral scientists have been part of the agenda of the U.S. Global Environmental Change Research Program since its inception in 1989. The International Human Dimensions Programme on Global Environmental Change (IHDP), a joint venture of the International Council of Scientific Unions and the International Social Science Council, has also provided an opportunity for these scientists to investigate the human aspects of global change. Furthermore, the Center for International Earth Science Information Network (CIESIN) at Columbia University has served as a depository for social science data about global change.

In the legislative and regulatory arena, the major laws – the Clean Air Act, the Clean Water Act, the Resource Recovery and Conservation

The view from Alaska's Dalton Highway.

Photo by Chris Ryan, COSSA

Act – have all required input from social and behavioral scientists. Economists and statisticians have provided research techniques, while other social scientists have examined other factors important to the implementation of rules that govern environmental protection.

Finally, protecting a special linguistic environment – endangered languages – is another area where social and behavioral scientists have contributed knowledge and understanding in an especially unique and pathbreaking way.

Human Dimensions of Global Environmental Change

Global environmental change is usually defined as climate change, ozone depletion, and biodiversity loss. Accumulating data on trends in these areas show an accelerating degradation of the world's physical environment. The critical question we must answer is whether the world can develop economically and socially while at the same time preserving its natural endowment. Concern about the extent, degree, and economic costs of environmental change impacts policy agendas and market conditions worldwide.

Geographer Robert Kates, Brown University emeritus, has noted that global processes have impacts on local places, but local actions are the foundations for global trends. For example, population dynamics are affected by access to modern birth control methods, the availability of education for women, and other local factors, but these clearly impact such worldwide trends as total global population and movement of people from one place to another.

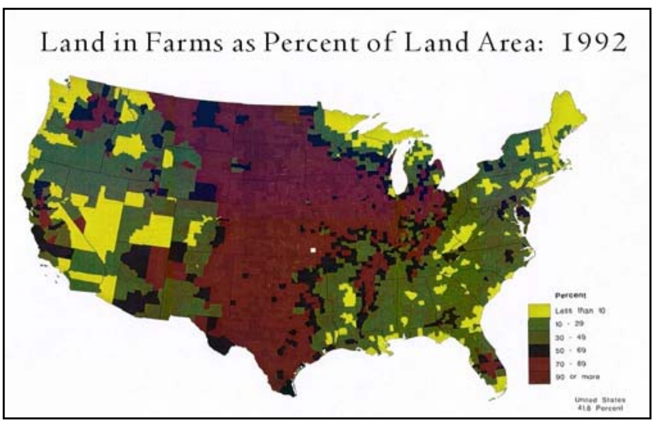
How humans use their environment, how the environment impacts humans, and how humans respond to environmental change comprise the research agenda for social and behavioral scientists in this area. Surveys that determine shifts in attitudes and beliefs, demographic analyses of migration, economic analyses of impacts on markets, and examinations of governmental and non-governmental institutions are all part of social and behavioral researchers' contributions to protecting the environment.

Human Use and Impacts on the Environment

Human actions unavoidably modify or transform nature. They are often intended to do so. The impacts have been so extensive and profound that it is now difficult to speak of a “natural” environment. Social scientists have compiled major global inventories of the human impacts on the environment. Studies at local and regional levels have clarified specific instances of human-induced landscape transformation. Environmental degradation in the Himalayas, patterns and processes of deforestation in the Philippines and the Amazon, desiccation of the Aral Sea, degradation of landscapes in China, and the magnitude and character of pre-Hispanic environmental change in the Americas are all examples of how the social and behavioral sciences are studying the basic impact of global change on people’s lives. The work of the IHDP’s Land Use and Land Cover project and the work of Emilio Moran of Indiana University have been especially important.

Significant social science research has examined how humans’ use of the Earth’s land has changed the global environment. The transformation of the Earth’s surface, through tropical deforestation, for example, has been a primary influence on global atmospheric patterns. In addition, how humans use the soil in agriculture has affected biodiversity, and the use of freshwater to irrigate lands impacts ecosystems throughout the world. Land-use and land-cover dynamics play a significant role in increasing the vulnerability of places and people to environmental degradation.

Agriculture is a major land use in much of the Great Plains and Midwest.



Source: U.S. Census Bureau

Environmental Impacts on Humankind

The consequences of human or naturally induced environmental change have also been scrutinized by social and behavioral scientists. Studies have examined the impacts of a variety of phenomena, from floods and droughts to disease and nuclear radiation releases. These works have generally focused on the differing vulnerabilities of individuals, groups, and geographic areas, demonstrating that environmental change alone cannot explain human consequences.

Sociologist Andrew Szasz of the University of California at Santa Cruz has investigated issues relating to environmental inequality. Szasz's investigations of disposal of hazardous wastes in Silicon Valley showed that toxic emissions were concentrated in neighborhoods that tended to be poorer and more Latino than the rest of the county. Structural factors such as national and local governments, economic markets, property rights, social movements, and international organizations all contribute to those impacts (including disparities in them) and determine the responses to change.

Economists have developed models to examine the economics of climate change. Two of them devised by William Nordhaus of Yale are called the Digital Integrated model of Climate and the Economy (DICE) and the Regional Integrated model of Climate and the Economy (RICE). Each of these has allowed Nordhaus to address the potential issues raised by future climate change including uncertainty, international coordination, and institutional design as well as the economic stakes of investing hundreds of billions of dollars a year to slow or prevent climate change.

Human Perceptions and Responses to Environmental Change

Society's ideas and attitudes have a powerful influence on human-environment relations. Through their technique of integrated assessments (models that represent the complex feedbacks among human and natural systems), social and behavioral researchers have documented the roots and character of particular environmental situations. They have also recognized that the impacts of environmental change on human populations can be strongly mitigated or even prevented by human actions like conserving energy and investing in renewable energy sources, producing more fuel efficient cars, restricting chlorofluorocarbons in air conditioners and refrigerators, and expanding mass transit operations. Accurate perception of change and its consequences is a key component in successful mitigation strategies. Researchers have also made important contributions to understanding how perceptions of risk differ from reality, and how communication of risk can amplify or dampen risk signals.

Geographer Gilbert White of the University of Colorado captured the importance of perceptions of available mitigation strategies in his concept of "range of choice," which has been applied to inform policy by illuminating the options available to different actors at different levels. In the case of floodplain occupancy, such options include building flood control works, controlling development in flood-prone areas, and allowing affected individuals to absorb the costs of disaster. In the case of global climate change, options range from curtailing greenhouse gas emissions to pursuing "business as usual" and adapting to change if and when it occurs.

Social and behavioral scientists have produced numerous case studies of societal responses to a wide variety of environmental challenges. Researchers at the Center for Integrated Assessment at Carnegie Mellon University have found, for example, that frequent, small events rarely excited people enough to adopt new adaptation or mitigation strategies. People on the whole feared future changes in their environments, but when incremental impacts were less than those anticipated, their adoption of new adaptation or mitigation strategies decreased. Slowly changing environmental conditions, therefore, did not tend to motivate deliberative strategies to address such changes.

The International Global Environmental Change and Human Security project examines the options available for individuals and communities to end, mitigate, or adapt to threats to their human, environmental, and societal rights. The focus is on what types of environmental change threaten human security and which strategies are most effective in situations of environmental stress.

Regulatory Policies

Cost Benefit Analysis

When governments seek to protect the environment through laws and regulations, one method is to simply find out what acts cause harm and then simply outlaw them. However, matters are usually more complicated. Usually, that which causes harm or threatens danger also provides benefits. The question, then, is not how to prohibit something altogether, but rather how to accommodate something potentially dangerous, but also potentially useful, into the framework of workplace production and social consumption. Arranging for this fit is very much a matter for the social and behavioral sciences.

One of the most important contributions the social sciences have made to environmental regulation has been cost-benefit analysis (CBA). This comprehensive approach toward judging which precautions are worth taking and which cost more than they are worth has been used at every stage of the regulatory process: in the judgments made by administrative agencies about what regulations to propose; in the judgments made by the President about what regulations to support as part of his administration; and in the judgments made by Congress about what regulations to sustain or overturn. In a world in which there is always more to be done than can be paid for, no one can afford to ignore the costs and benefits of any proposed line of action. Applied early to water resource management projects, CBA became a tool of wide applicability, moving beyond dams and other water projects into just about every corner of government activity.

Cost-benefit analysis evolved in two directions as a result of work by economists. The first involved codifying the rules for analysis by making them consistent with economic theory. The second involved developing new methods for estimating the financial benefits of policies and projects that produce non-marketable goods or services.

Codification occurred early, but the extension to non-marketable goods took longer to achieve consistency. The simplest technique, called the "contingent valuation method," gained acceptance in the 1970s and continues in use today. It captures non-use values based on questions about willingness-to-pay and thus can quantify damages to natural resources in practical situations, such as in oil-spill litigation.

However, the questions raised for the social sciences by regulation of the environment are much more varied and often too detailed for any single methodology. Careful implementation of regulations often turns on judgments that are best illuminated by cognitive psychology, sociology, or workplace anthropology. In addition, social scientists can, and do, illuminate the institutional frameworks by which regulation comes to be formulated in the first place.

Elinor Ostrom and her colleagues at Indiana University's Center for the Study of Institutions, Population, and Environmental Change have devised ways for institutions to equitably manage common-pool resources such as fisheries, grazing grounds and water supplies. J. Clarence Davies of Resources for the Future and Jan Mazurek have evaluated the U.S. system of pollution control focusing on Congressional enactment of environmental laws and their subsequent implementation, particularly by the states. Evan Ringquist of Florida State University has examined at the EPA's Office of Water Quality and found that executive and legislative efforts at political control not only reduced enforcement activity, but were also ineffective at altering agency values.

Furthermore, cost-benefit analyses assume that individuals are willing to make trade-offs among values, including moral values. However, research by psychologist Jonathan Baron of the University of Pennsylvania has shown that individuals steadfastly protect their values and are unwilling to trade them off for contradictory economic values. For example, individuals may place a higher value on preserving forests regardless of the economic or social good of producing more timber.

Cooperation Rather than Regulation

Scholars who focus on the interaction of law and society have produced numerous studies designed to determine the most effective methods of regulation. In 1984, Keith Hawkins of Oxford University outlined the difficulties and dilemmas of environmental enforcement in *Environment and Enforcement: Regulation and the Social Definition of Pollution.* He pointed out that enforcement agencies must play a game of bluff in negotiating corporate compliance with environmental rules since they lack the means to prosecute all potential violators. Others have highlighted the failures of corporate regulation, documented the political economy of hazardous waste regulation and its complexities, and outlined the "limits of law" for pollution controls in general.

Alongside these studies documenting the limitations of environmental regulation, a vast literature has emerged comparing the desirability of policies that aim to elicit voluntary compliance with environmental laws to a more criminalization/enforcement approach. Christopher Stone of USC Law School, in *Where the Law Ends*, argues that the adversarial, law enforcement approach to environmental regulation is inherently limited and perhaps counter-productive. Subsequent scholars have emphasized the advantages of more cooperative approaches. Ian Ayres of Yale Law School and John Braithwaite of the Australian National University in *Responsive Regulation: Transcending the Deregulation Debate* argue for "tripartism," or an "enforcement pyramid" in which citizen associations play an equal role with industry and the government in eliciting environmental compliance.

Economists have also helped to develop alternatives to regulations. The right to emit a certain amount of pollution per unit of time into the air or water, embodied in a permit, is a relatively recent creation, originating from the regulations written to implement the Clean Air Act of 1970 and the Clean Water Act of 1972. Even before these rights were established, economists had been suggesting that creating them and making them marketable would lead to more efficient outcomes.

Originally developed by the EPA in the 1970s to deal with the failure of metropolitan areas to comply with the sterner features of the Clean Air Act, the idea was to create what were known as "bubbles, offsets, and emission reduction credits" that allowed ways around meeting the standards. This was followed by a "cap and trade" system for sulfur dioxide emissions during the acid rain controversies of the 1980s. The permits have functioned in two forms: company-to-company private transactions and annual public auctions of permits set aside by the EPA for just this purpose. Analyses of the data generated from these auctions have suggested that this policy has worked and that the prices at which permits have changed hands are lower than originally contemplated. The Bush administration hopes to extend this system to carbon dioxide emissions as well.

Measuring the Environment

Measuring and assessing air and water pollution and their impact on public health is extremely complex. The National Research Council has published two reports on this subject: *Nature's Numbers: Expanding the National Economic Accounts to Include the Environment* and *Ecological Indicators for the Nation.* In the past 20 to 25 years, statisticians have developed methods for identifying environmental problems and providing information of known quality for input into the environmental policy and decisionmaking processes. Until the end of the 20th century, statistical research and methods development addressing air and water focused primarily on the need for models to assist in characterizing the uncertainty associated with our ambient measurement and monitoring systems and to assure the quality of the data generated by the ambient monitors. Emphasis is now being placed on how to best use the monitoring data to better characterize the quality of our air and water and to assess trends in air and water quality. Some areas in which statistical research and methods have focused on environmental issues are.

- Better assessments of the uncertainty in measuring ambient pollution levels, i.e., the quality assurance process, improved measurement technology

- Better estimation of the uncertainty associated with quantitative risk assessment/management of environmental problems

- Development of statistical methods and models to deal with temporal and spatial variability of measurements used in assessing compliance and measuring environmental trends

- Development of innovative monitoring and data collection strategies to assure that representative data were collected from monitoring systems (e.g., air or water monitoring systems) in cost effective ways

- Better public understanding and interpretation of statistical uncertainty in environmental decisions

- Better education of the pubic, policy makers, and courts on statistical methods and their interpretation in environmental policy, decision making, and enforcement.

Hundreds of millions of dollars are spent annually on the collection of environmental data. The data are collected and maintained in separate databases. Often many of the same variables are collected and differ only in space and time dimensions. New methods need to be developed to allow the integration of these databases. Once integrated, more powerful analyses can be performed and better information on the state of the environment and on environmental trends will be available to the public and policy makers. These integrated databases can also benefit from linkage with socio-demographic and health data collections. Researchers can then employ data mining tools, allowing analysts and policy makers to explore the information for patterns and relationships that may provide insights into environmental problems and issues.

Endangered Languages

Research in linguistics, the study of all aspects of naturally occurring human language, is sustained by access to data from a broad and varied sample of languages. Recent sources estimate that 6,000-6,700 human languages are currently spoken worldwide. Many of these are now in danger of being lost to their communities: over 50 percent of the world's languages are no longer taught to children; the passing of today's adult speakers will bring about the loss of their communities' traditional languages. It is estimated that between 50 and 90 percent of the languages currently spoken will no longer be used by the year 2100.

Under the rubric of "endangered language varieties" we may include not only indigenous languages whose continuity is threatened, but also non-mainstream dialects of dominant languages. In the United States, for example, varieties of English spoken in Appalachia and on the Outer Banks of North Carolina are fast disappearing, as is Gullah, an English based creole once generally spoken by African Americans living on barrier islands off the southeastern coast.

The Future

Research in the social and behavioral sciences will become increasingly important in examining global environmental change and the demise of languages as a result of such change and other factors. Models of climate change and integrated assessments of human and natural systems will become more sophisticated and useful; research results will become more critical in legislation and policy decisionmaking. Robert Kates, William C. Clark of Harvard, and numerous others have discussed the notion of "sustainability science." They call for "continuing the effort to understand the fundamental character of interactions between nature and society." These include the interaction of global processes with the ecological and social characteristics of particular places and sectors. It will also require, they argue, "advances in our ability to address such issues as the behavior of complex self-organizing systems, as well as the responses, some irreversible, of the nature-society system to multiple and interacting stresses."

Topics still on the environmental research agenda include: further impacts of population on the environment, including international migration; innovation and diffusion processes; resource use and management; anticipatory and reactive adaptation and mitigation; global collective action, institutions and governance; economic issues, such as international trade patterns; and methodological issues such as non-market valuation, environmental accounting, and techniques for large-scale modeling.

GIS: GEOGRAPHIC INFORMATION SYSTEMS

A geographic information system (GIS) is software technology for the management and analysis of digital information referenced in some way to locations on the earth. With a system for data management, GIS links geographic information with descriptive information and provides an integrating framework that supports the information technology infrastructure.

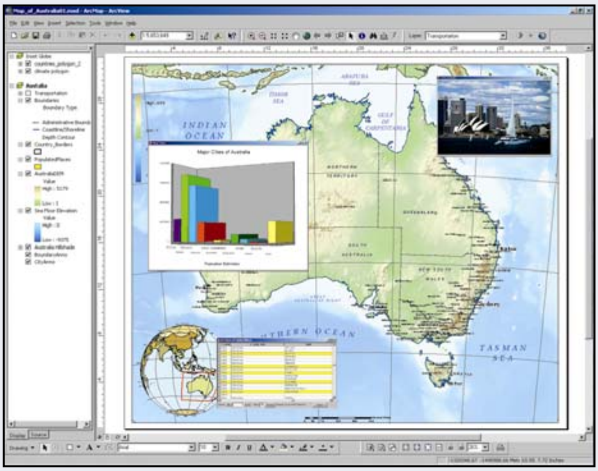
Geographic information has a geographic reference – a street address, latitude and longitude coordinates, or a city name. The records in a client database where each customer has an address are accessible for analysis in a GIS. Other sources of geographic information are data collected by global positioning systems, remote sensing, traditional land surveying, and census data.

The use of GIS is becoming more widespread, because geography communicates a broader context of issues through a visual language – maps. GIS provides a way to connect disparate data that might otherwise go unnoticed in text or statistical tables. Plotting the occurrences of a disease on a map can show clusters of outbreaks suggesting further study; revealing a pattern of burglaries in a specific location might suggest extra patrols.

More than a systematic way to accurately collect, manage, and present location-based information, GIS is a sophisticated analytical and problem-solving tool that brings hidden correlations to the surface. Spatial analysis can be as simple as mapping where things are, densities within an area, or changes in a region over time. Analysis methods can also be very complex, involving models of real-world attributes and values that combine many layers of data. Today, GIS professionals are working on projects in a range of disciplines and industry sectors such as local government, environmental management, land use planning, transportation, health care, retail business, and telecommunications. With GIS, it is possible to evaluate practical consequences of decisions, monitor the ►

implementation of past decisions, and follow events as they unfold in real time.

Telecommunications specialists use GIS to design radio networks, evaluate alternative configurations, and model radio propagation analytically. GIS has enabled local governments to streamline lengthy permitting processes, which can now be done online in minutes. Organizations are combining GIS with mobile devices to provide real-time locational services such as improved delivery or emergency services. GIS helps epidemiology researchers find clues to the spread of a disease by studying outbreaks of the disease over time, by location, and in groups of people.



Programs like ArcView visualize layers of data to reveal and present geographic trends and patterns.

Source: Environmental Systems Research Institute Inc.

Analysis components of GIS software enable police departments to pinpoint areas where drug-trafficking is likely to occur by overlaying locations of kids-at-risk, low-income areas, single-parent households, public housing projects, bars, and liquor stores. And three-dimensional visualization of urban areas provides police with better information for developing deployment patterns. Departments of transportation are increasingly using GIS to manage real-time traffic data, develop mass transit alternatives, and provide information to the traveling public. ►

In the 1990s the National Center for Geographic Information and Analysis (*www.ncgia.ucsb.edu*), and now The Center for Spatially Integrated Science (*www.csiss.org*), both headquartered at the University of California at Santa Barbara and directed by Michael Goodchild, have been in the forefront of developing the science of GIS and promoting its use by social scientists.

ENDNOTES

(Arranged in order of appearance in the text.)

Introduction

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Heidi Hamilton of Georgetown University prepared the section on Language and Aging. Gary Kreps of the National Cancer Institute contributed a paper on communications and health. John Hagen of the Society for Research in Child Development and Theodore Wachs of Purdue University contributed a paper on nutrition and child development. Judith Auerbach of NIH's Office of AIDS Research reviewed the section on HIV/AIDS.

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