OBSERVER

Published by the American Psychological Society

SPECIAL ISSUE FEBRUARY 1992

HUMAN CAPITAL INITIATIVE:

REPORT OF THE

NATIONAL BEHAVIORAL SCIENCE RESEARCH AGENDA COMMITTEE

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A Call For Research Initiatives

This document, *The Human Capital Initiative*, outlines six areas of broad national concern:

- **Productivity in the workplace,**
- **Schooling and literacy,**
- **The aging society,**
- **Drug and alcohol abuse,**
- **Health, and**
- **Violence in America.**

Not a day passes without one or more of these concerns being featured prominently in the national news. And while these six areas do not exhaust the concerns facing the country, each is a substantial, even overwhelming, problem. Each presents, at base, problems of human behavior. Each involves questions that will require *both* basic *and* applied research as well as development.

This document, developed by representatives of nearly 70 behavioral and psychological science organizations, is the first step in what is intended to become a continuing process of bringing systematic research to bear on problems of national interest. The next step is to prepare specific research initiatives, as described in the following paragraphs.

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Milton D. Hakel
Chair, Research Agenda Coordinating Committee

First, "specific research initiative" will be defined, and the intended audiences will be identified. Next, organizational considerations are presented. This invitation concludes with a description of how to participate in this second phase of the Human Capital Initiative.

The Invitation

As chair of the Research Agenda Coordinating Committee [see below for list of members] for the Human Capital Initiative, I invite individual societies, or consortia of societies, to prepare specific research initiatives that will be presented to Congress and federal and other agencies. This invitation is extended to all research-oriented societies within the general domain of psychology, broadly construed. Interdisciplinary links in the behavioral, biological, and social sciences are encouraged.

This invitation is being distributed directly to the participants in the third (1991) National Behavioral Science Summit and to the current officers of the 65 organizations they represented. This invitation is also being distributed widely via publication to assure the broadest possible base of participation.

Specific Research Initiative Defined

A specific research initiative is a document that: (1) defines tangible problems in the real world, (2) describes our current knowledge with examples of our successes in fields or subfields of research relevant to those problems, (3) identifies the key issues that need to be and feasibly can be investigated and ameliorated within the next decade, and (4) summarizes the potential benefits of such research.

In scope and focus, it is like a "Program Announcement" or a "Request for Applications" issued by federal agencies. It is more general than a "Request for Proposals." It should cover needed research for a 5- to 10-year time span. It is brief by necessity, with a minimum of technical detail and jargon. The six areas of broad national concern in *The Human Capital Initiative* are not meant to limit the specific research initiatives that might come forward. Rather, they are intended to serve as starting points, to stimulate us to conduct research that adds to both theoretical and practical knowledge of these and other crucial issues.

Audiences

Specific research initiatives are intended for several audiences: Members of Congress and state legislatures, the President and federal and state government executives, policy makers and program officers in grant and contract agencies and foundations, and members of the general public.

Purpose

With the nation's attention concentrated more clearly on domestic problems, we believe a compelling case can be made for increased invest

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ment in research. We expect that specific research initiatives will play important roles in debates about research funding authorizations and expenditures. We believe that researchers, through their societies, should play a bigger part in such debates.

We believe that it will be advantageous for societies to participate in this second phase of the Human Capital Initiative. We offer visibility for the initiatives that will be created. We offer access to decision makers through direct linkages in Washington. And a coordinated approach can have far greater impact than piecemeal activities by individual groups.

Organizational Considerations

It has always been the case that individual investigators, groups, and societies could suggest specific research initiatives to whomever they wished, and that will continue to be the case. No group or society is obligated to work under the Human Capital Initiative umbrella exclusively, or at all.

The diversity of research-oriented societies in psychology was quite evident among the 65 societies whose representatives attended the third National Behavioral Science Summit, held in Houston, Texas, in January, 1991. It was also evident that there is a need for societies to be able to collaborate on issues of common concern, such as addressing the national needs identified here in *The Human Capital Initiative* and advancing the case for investment in research. The Human Capital Initiative Coordinating Committee now exists to foster collaboration to this end.

Creation of the Coordinating Committee was authorized by a vote of the participants at the third Summit. It is the successor to the Steering Committee, chaired by Janet T. Spence and Donald J. Foss, that wrote *The Human Capital Initiative.* The Steering Committee operated under the auspices of Frances Horowitz, American Psychological Association, Duncan Luce, Federation of Behavioral, Psychological and Cognitive Societies, and James McGaugh, American Psychological Society, as authorized by the participants in the second Summit, held in Tucson, Arizona, in January, 1990.

The Coordinating Committee's charge is to: (1) recruit societies into the drafting of specific research initiatives, (2) organize such drafting subcommittees as are needed, (3) coordinate and review the work of these subcommittees, and (4) coordinate the publication and dissemination of the final documents containing the initiatives developed by the drafting groups. The committee's members are: Rue Cromwell, University of Kansas, Michael Davis, Yale University, Kay Deaux, CUNY-Graduate Center, James Greeno, Stanford University, John Hagen, University of Michigan, and Charles Perfetti, University of Pittsburgh. The Committee is chaired by Milton D. Hakel, Bowling Green State University, and it is staffed by Alan Kraut, American Psychological Society.

Participating in this Phase

Response to this invitation is open without deadline. We seek the participation of societies or consortia of societies so that the specific research initiatives created through this process will represent questions of interest to identifiable communities of researchers. When societies indicate their interest in participating, they will be invited to join a drafting subcommittee. Societies may be involved in the drafting of more than one specific initiative.

The Coordinating Committee will attempt to minimize overlap / redundancy in the planned initiatives and to ensure that all interested societies have the opportunity to participate. The Chair of the Coordinating Committee will be able to provide information about the substance of each specific initiative being planned or drafted.

The time is right for basic and applied research and development that strengthens America's human capital.

MILTON HAKEL
CHAIR, RESEARCH AGENDA
COORDINATING COMMITTEE

The Coordinating Committee will make no effort to set priorities among specific research initiatives, but drafting subcommittees are free to set priorities among topics within their brief.

The Coordinating Committee will seek to present specific research initiatives to interested parties in Washington as soon as they are ready. Thus, drafting subcommittees will be free to set their own schedules. We also will follow a cumulative strategy, adding new specific research initiatives to the Human Capital Initiative portfolio as they become available.

Statements of interest in participation in the drafting of specific initiatives and other inquiries should be directed to Milton D. Hakel, Regents' Scholar and Professor, Department of Psychology, Bowling Green State University, Bowling Green, Ohio 43403-0228 (Tel.: 419-372-8144, Fax: 419-372-6013, Bitnet: MHAKEL@TRAPPER).

Conclusion

The Human Capital Initiative is a bold venture for the many specialized societies of researchers in psychology and related disciplines. It is a marked departure from "business as usual," being the first effort to bring large-scale inter-society collaboration to bear on the identification of research needs. These are not "normal times," and the enormity and the complexity of the nation's problems demand an innovative approach. Research alone will not solve the nation's problems, but these problems won't be solved without systematic inquiry and painstaking analysis on a far larger scale than ever before. The time is right for basic and applied research and development that strengthens America's human capital. ♦

Participants in the 1990 Behavioral Science Research Summit - Tucson, Arizona

Participants in the 1991 Behavioral Science Research Summit - Houston, Texas

HUMAN CAPITAL INITIATIVE

REPORT OF THE

NATIONAL BEHAVIORAL SCIENCE RESEARCH AGENDA COMMITTEE

FEBRUARY 1992

DEVELOPED BY REPRESENTATIVES OF

Academy of Behavioral Medicine Research
Academy of Management
Adult Development and Aging
American Association for Applied and Preventive Psychology
American Association of State Psychology Boards
American Board of Professional Psychology
American Educational Research Association
American Evaluation Association
American Psychological Association
American Psychological Society
American Psychological Society Student Caucus
American Psychology-Law Society
Animal Behavior Society
Applied Experimental and Engineering Psychology
Association for Behavioral Analysis
Association of Black Psychologists
Behavior Genetics Association
Cambridge Center for Behavioral Studies
Clinical Psychology
Cognitive Science Society
Society for Community Research and Action
Council of Graduate Departments of Psychology
Council of University Directors of Clinical Training
Counseling Psychology
Developmental Psychology
Eastern Psychological Association
Educational Psychology
Evaluation, Measurement, and Statistics
Experimental Psychology
Federation of Behavioral, Psychological and Cognitive Sciences
General Psychology
Health Psychology
Human Factors Society
International Union of Psychological Science
Jean Piaget Society
Midwestern Psychological Association
National Academy of Sciences
National Association of School Psychology
New England Psychological Association
Physiological and Comparative Psychology
Population and Environmental Psychology
Psychology of Women
Psychometric Society
Psychonomic Society
Psychopharmacology and Substance Abuse
Rocky Mountain Psychological Association
Society for Applied Multivariate Research
Society for Computers in Psychology
Society for Consumer Psychology
Society for Industrial and Organizational Psychology
Society for Judgement and Decision Making
Society for Mathematical Psychology
Society for Multivariate Experimental Psychology
Society for Neuroscience
Society for Personality and Social Psychology
Society for Psychophysiological Research
Society for Research in Child Development
Society for Research in Psychopathology
Society for the Advancement of Social Psychology
Society for the Experimental Analysis of Behavior
Society for the Psychological Study of Social Issues
Society for the Study of Lesbian and Gay Issues in Psychology
Southwestern Psychological Association
Teaching of Psychology
Western Psychological Association

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Background

In January 1990, the American Psychological Society convened a Behavioral Science Summit in Tucson, Arizona. The Summit conferees, representing almost 70 psychological organizations, unanimously endorsed the development of a *national research agenda* that would help policy makers in federal and other agencies set funding priorities for psychological and related sciences.

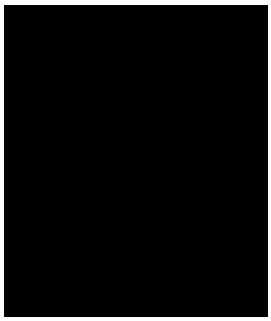
The conferees asked Frances D. Horowitz, the American Psychological Association's Science Advisor; R. Duncan Luce, President of the Federation of Behavioral, Psychological and Cognitive Sciences; and James L. McGaugh, President of the American Psychological Society, to appoint an Interim Steering Committee to draft a document based on the deliberations of the two-day summit. The Interim Steering Committee was made up of: Janet T. Spence and Donald J. Foss, University of Texas at Austin, Co-chairs; David Berliner, Arizona State University; James Blascovich, State University of New York at Buffalo; Milton D. Hakel, Bowling Green State University; J. Bruce Overmier, University of Minnesota; Sandra Scarr, University of Virginia; and Larry R. Squire, University of California at San Diego.

In January 1991, the Steering Committee reported its progress at the next Behavioral Science Summit held in Houston, Texas. Organizations participating in both Summits are listed on page 3. The Summit Organizations provided feedback to the Steering Committee and agreed to begin the second phase of the Human Capital Initiative: to propose specific research projects tied to priorities laid out in this document. That second phase is now underway.

The pages that follow are the product of the Interim Steering Committee. This document, together with portions of the two APS Summits, was supported by grants from the National Institute of Mental Health to the American Psychological Society, and we gratefully acknowledge this support.

The mission of the Steering Committee was to:

- Identify a unifying theme or themes for behavioral research from among those developed at the summit;
- Invite specialty organizations in their subsequent comments to attach more specific initiatives; and
- Provide the context of one or several strategies aimed at developing a consensus model of a common research agenda.



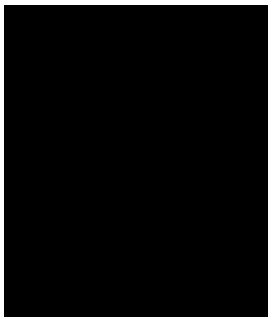
Donald J. Foss

PREFACE

Do You Believe In Miracles?

Donald Foss
and
Janet Spence

Co-Chairs
*National Research Agenda Steering Committee **



Janet T. Spence

The 1992 Olympic games bring to mind one of the biggest upsets in the history of sport, the U.S. hockey team's defeat of the Soviet National Team at the 1980 Olympics. When victory was certain, the TV announcer cried out the now famous question, "Do you believe in miracles?". It was a great moment for U.S. sports fans, and the announcer did a splendid job of involving the audience. But of course, we don't really believe in miracles, and we suspect that so labelling a stunning victory takes a little away from the hard work, skill, and highly motivated play of the athletes and their coaches. It was a marvel, if not a miracle.

Sports victories such as this are a welcome relief from more serious matters. The United States is now faced with a host of vexing problems threatening the well-being of its citizens, coupled with unprecedented opportunities to advance our common welfare. Many of the challenges involve issues about which psychology has contributed—or has the potential to contribute—a great deal. Advancements in our knowledge are unlikely to come in miraculous breakthrough sizes; they will come from systematic, motivated, and creative work by psychological scientists across all our subdisciplines. Such work has tremendous potential payoffs for society and for our basic understanding of the world.

If our understanding is to deepen and applications are to be developed, then appropriate opportunities must be identified by the research community and resources must be applied to them. It was to this purpose that the National Behavioral Science Summit was convened in the winter of 1990—under the sponsorship of the American Psychological Society—to begin developing a national research agenda for psychology. The Summit participants, nearly 100 psychologists representing almost 70 behavioral science organizations, heard keynote speaker and psychologist Alan Leshner, Deputy Director of the National Institute of Mental Health, say that psychologists could shape the direction of research support, but that they needed to bring in "large events," ideas around which to build federal initiatives. These ideas could form the bases from which national research priorities could emerge and be established in the future.

Summit representatives deliberated, discussed, and in a heartening demonstration of unanimity of purpose, decided that developing a national agenda was in order. They empowered three key leaders representing the American Psychological Association, the American Psychological Society, and the Federation of Behavioral, Psychological and Cognitive Sciences to appoint a Steering Committee whose mission was to identify unifying themes for behavioral research, and to provide several strategies aimed at developing a consensus model of a common research agenda. From the start it was clear that there would be two phases to this process. (The Background section on page 7 reviews the history of the process.)

The Steering Committee met on numerous occasions over the next year, grappling again with many of the same issues that Summit participants had found vexing. Our work built on prior efforts, but rather than focusing on the state of knowledge and promising areas of investigation in our subdisciplines, the Committee identified a set of major problems facing the nation to which psychological knowledge could bring important insights. The primary audience was

Continued on next page

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not intended to be ourselves. Instead, the Committee looked for a valid, overarching theme and a subsidiary set of large ideas that would appeal to colleagues in federal agencies, members of Congress and their staffs, as well as to decision makers in the private sector. At the same time, these ideas were ones designed to appeal to research workers across a wide spectrum and around which colleagues could build research initiatives.

The *Human Capital Initiative* is the result. It speaks on behalf of the science of psychology in all of its branches and provides a research agenda on behalf of the people. It tries to make clear that there is a two-way path from basic research to significant human issues.

The *Human Capital Initiative* is a framework for a research agenda; it is not the agenda itself since the latter requires a dynamic approach. The document is meant to permit—indeed, to stimulate—scientists to construct "hooks" on which they can hang large but more specific research initiatives. Supplementing this document will be a second one, currently being prepared by the Coordinating Committee, in which a series of such initiatives will be presented. On page 1 is an invitation to participate in the ongoing process of developing a national research agenda.

We believe these efforts are just one part of a very important process. If we can work together, telling our story to our natural constituents, if we can stimulate proposals from groups of colleagues and work for them energetically, then we have a chance to improve our knowledge base in a significant way to the benefit of our science and of the public weal. That would be a marvel.

Advancements in our knowledge are unlikely to come in miraculous breakthrough sizes; they will come from systematic, motivated, and creative work by psychological scientists across all our subdisciplines.

DONALD FOSS
JANET SPENCE

. . . we have a chance to improve our knowledge base in a significant way to the benefit of our science and of the public weal.

DONALD FOSS
JANET SPENCE

* Janet T. Spence and Donald J. Foss, The University of Texas-Austin (Co-chairs); David Berliner, Arizona State University; James Blascovich, State University of New York-Buffalo; Milton D. Hakel, Bowling Green State University; J. Bruce Overmier, University of Minnesota; Sandra Scarr, University of Virginia; and Larry R. Squire, University of California-San Diego.

Photo courtesy of Ann Howard - Leadership Research Institute

Behavioral research underlies the development of assessment centers which allow efficient determination and training of organizational leadership skills.

To develop effective plans to improve our society, we must know more about ourselves. Such knowledge comes from serious research relevant to the most important problems of contemporary society, including basic research that may eventually help remedy many of them at once.

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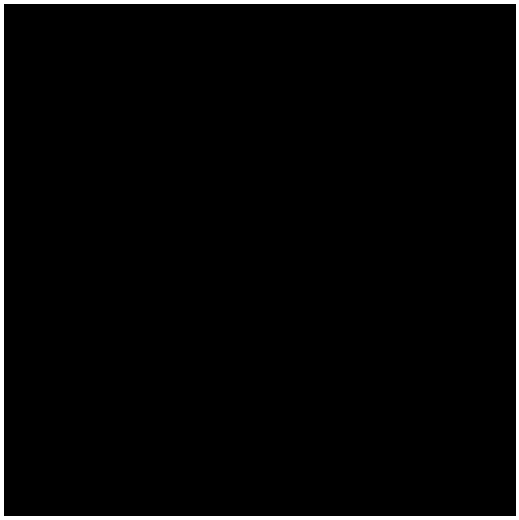

Photo courtesy of Emory University Yerkes Primate Research Center

Psychological research on the effects of prenatal exposure to drugs of abuse provides critical knowledge about potentially effective rehabilitation strategies.

Because people are our most important natural resource, we propose a Human Capital Initiative, a sustained, national research effort, to enhance understanding of human development and behavior . . . to support research relevant to a set of crucial national priorities.

NATIONAL BEHAVIORAL SCIENCE RESEARCH AGENDA COMMITTEE

Photo © 1989 – Walter Urie

Psychological research on brain and behavioral processes requires extremely sophisticated computers and related technology.

CHAPTER 1

A Research Agenda for People

Prologue

Were there any good old days? Compare the 1990's with the 1890's. Better medical facilities and public health care have increased the average life span; technology has removed the drudgery from many aspects of daily life; and opportunities for women and minorities—previously cut off from the mainstream—are greatly improved. Nevertheless, today America is still the land of concern as well as the land of opportunity. Many American families feel the grip of unrelenting stress. Each day over 1,800 children are abused, and some 3,000 children run away from home. In New York City, one person in 20 is arrested each year. In Texas, one adolescent in three drops out of high school. The lifetime risk of having a diagnosable mental disorder is 20 percent.

The cost of such serious problems in lost productivity alone amounts to billions of dollars a year. The cost in lives disrupted and families shattered is greater still. The nation is hard-pressed to address all of the human needs of its people, yet our prosperity in the next century—and our sense of well-being as members of a community—demands that we try.

Policy makers legitimately differ on how to tackle the many problems facing American families and individuals today. Each year brings another round in the great social debates about productivity, education, child and elder care, mental illness, dropout prevention, drug-abuse prevention, literacy, crime, group conflict, health care, and other serious issues. These debates typically focus on who will pay for programs, what role the federal government should play, local versus national control, and so on.

But such questions, while important, deflect attention from a crucial point frequently ignored: even if we had considerably greater resources to devote to them, *all too often we simply do not know how best to deal with these challenges.*

Here, psychological science can be of immense value. Notice that nearly every issue mentioned above is, in large part, a *behavioral* one—a problem of how people develop, of how to train and motivate them, or of how people relate to one another. These problems all fall into the province of psychology.

The Human Capital Initiative

To develop effective plans to improve our society, we must know more about ourselves. *Such knowledge comes from serious research relevant to the most important problems of contemporary society, including basic research that may eventually help remedy many of them at once.* Research in psychology—whether it involves studying brain mechanisms underlying behavior or finding better ways to deal with group conflict—builds the needed knowledge base. With appropriate knowledge, issues can be not just addressed, but addressed wisely.

Because people are our most important natural resource, we propose a Human Capital Initiative, a sustained, national research effort, to enhance understanding of human development and behavior. The Human Capital Initiative is intended to support research relevant to a set of crucial national priorities.

National Problems and Research Themes

The Human Capital Initiative targets six critical problems that are facing our nation, communities, and families today and that can be helped by psychological science:

- **Worker productivity**
- **Schooling and literacy**
- **The aging society**
- **Drug and alcohol abuse**
- **Mental and physical health**
- **Violence**

In the pages ahead, we discuss research objectives for each problem in turn. These objectives are organized into four broad Research Themes that reflect major subsets of psychological science:

- **The Psychology of the Individual: Behavior, Mind, and Brain**
- **Growing Up: Human Development and Families**
- **The Psychology of the Group: Human Relations and Organizations**
- **Education, Training, and Performance**

Behavioral and psychological considerations are key facets of such emerging fields as neuroscience, behavioral medicine, psychoneuro-immunology, and computer-based education.

NATIONAL BEHAVIORAL SCIENCE RESEARCH AGENDA COMMITTEE

Psychological Research: Basic and Applied

Before discussing the targeted problems, however, we pause here for some general remarks on psychological research, both basic and applied.

When psychologists face a practical problem, research directed at that problem is sometimes the best approach. For example, if we need better predictors of job performance, we might focus our attention on making better tests. In other instances, though, the chance of long-range success is greater if the problem is attacked less directly through a study of basic psychological processes. For example, designing the optimal way to teach reading might require us first to discover how the child gains skills, how the reading process builds on spoken language, how to assess the child's awareness of language, how memory and attention work, how peer groups and families influence learning, and even how the eyes move during reading. Or, to take another example, discovering the processes underlying memory and problem-solving can have important implications for such practical matters as how best to learn to fly planes or repair them.

There is enormous value in supporting basic psychological science. A great many discoveries have been made already, and a large number have found practical applications. For example, we can now assess infants' sensory capabilities with surprising accuracy. It is thus possible to determine very early whether and to what extent babies have abnormal hearing. This permits earlier and more effective intervention. Indications are that certain intellectual abilities can be assessed nearly as early. Findings from the laboratory have led to other, cost-effective applications in places as various as the factory floor, the opthamologist's office, the airplane cockpit, and the homes of victims of panic attacks. Principles devised in laboratories of psychologists have influenced how x-rays are read and how astronauts and aircrews are trained. There is, in fact, a long list of success stories, many of which involve lives saved as well as dollars saved; and, as is typical, many of the practical applications were not anticipated when the basic research and theorizing first occurred. A famous psychologist, Kurt Lewin, once observed, "There is nothing so practical as a good theory."

The spinoffs of psychological research are not so much new products as new ways of helping people. In other words, they are applications that contribute to the better use of our human resources. Thus, an increased investment in psychological research across the basic-to-applied spectrum will benefit our society enormously.

Psychological science is, relatively speaking, inexpensive science. The price of increasing research in psychological science is small; the cost of not doing so is huge. We propose that increased attention and investment occur at such federal agencies as the National Science Foundation, the Alcohol, Drug Abuse and Mental Health Administration, the National Institutes of Health, the Environmental Protection Agency, and the Departments of Labor, Education, Justice, Energy, and Defense, because psychological issues impinge on all their missions. Increased attention from private agencies is also warranted. Even with it, of course, we cannot guarantee that solutions to the human problems we describe will be found easily or quickly. In fact, quick fixes are unlikely, given the complexity of the issues. However, progress will be significantly slower without a high national priority given to additional investment in such research.

Psychological research also augments other disciplines. Behavioral and psychological considerations are key facets of such emerging fields as neuroscience, behavioral medicine, psychoneuroimmunology, and computer-based education. To cite but one example, the sequencing of the human genome will be an extraordinary human achievement, but it will not, by itself, explain how the genetic code controls behavior. An effective study of the paths from genetic material to, say, mechanisms of attention (and its disorders) will require the collaboration of scientists trained in psychology as well as in biology and related fields.

Finally, we note the importance of setting a broad, national research agenda. This report begins the process of defining research opportunities and priorities. Later reports will outline more specific initiatives that offer special opportunities for increasing our human capital.

CHAPTER 2

Productivity in the Workplace

Introduction

U.S. businesses now spend, annually, nearly as much on the training and development of employees as governments spend on all of public education. This trend will undoubtedly continue. The future workplace can be expected to grow even more technologically sophisticated, demanding higher levels of skill to operate complex systems. Retraining of displaced workers and the initial training of new workers to operate at higher efficiency will prove big challenges in the years ahead. In addition, since productive work can yield personal satisfaction as well as products and services, we need to know as much as possible about designing jobs as well as matching those jobs to people. Individuals who take pride in their work are more likely to work well.

An optimal work force is necessary since competition is increasing nationally and globally. And this is happening at a time when there are major changes occurring in American demographics. Perhaps the most dramatic change is the aging of the population. Currently in the United States there are 10 workers for each retiree; by the year 2025, this ratio will fall to 3:1. And more and more, the work force will be made of women, minorities, and recent immigrants.

Meanwhile, technology continues to change the workplace and the demands on workers. This has brought the relation between technology and its human users under closer scrutiny. Issues of "human factors" are taking on renewed, and changing, emphases. Designers of systems need to know more about human skills, problem-solving abilities, and limitations, so that new technologies can assist people rather than frustrate them. But first the research community needs to know what to tell such designers. A vast area of opportunity exists here, from the better design of air-traffic control systems to the design of effective robots and aids to sensory capabilities. These will all be helped if we know more about the underlying psychological mechanisms relevant to them.

In addition, technology is changing the social organization of work. Many workers now confer via computer stations rather than face-to-face or by telephone. But how and when such arrangements yield cost-effective results is a question ready for deeper study. Also, better predictions (and, of course, fair ones) of who will be productive, honest employees are needed and can be obtained with further research. As tests improve, they promise to save enormous training costs.

Better training is not the only answer to a more productive work force. Currently, more than half of all women with young children work outside the home, a figure that will likely rise because of the growing need for workers. We need to devise adequate child-care programs and provide social supports for overburdened parents, especially single parents. Parents with undependable child-care arrangements are more apt to be late or to miss work altogether, leading to morale problems and attendant losses in productivity and self-esteem. But research is needed on how better to select and train child-care workers, as well as on how to maximize intellectual and social benefits to the children growing up in such a system.

Since we are the work force, its well-being is our own. Research to aid productivity—broadly defined—will contribute to every one of us.

The Psychology of the Individual: Behavior, Mind, and Brain

Solutions to complex challenges like those noted above are unlikely to come easily. Long-term solutions will surely rely, in part, on an improved understanding of cognition and motivation, as well as on the psychobiological mechanisms that mediate them.

For example, both high-level and midbrain-level functions support arousal and attention, which underlie any continuous performance of a task like those many industrial workers perform. Success on such tasks might be enhanced if the neural systems underlying attention and arousal were understood. This by no means implies anything like "direct" neural manipulation to achieve the desired end. Indeed, discoveries about the brain may reveal that optimal activation is produced by something as simple as an appropriate exercise regimen.

At the cognitive level, new models of skill acquisition are helping to explain such a common phenomenon as improvement with practice. We need to understand this phenomenon and its basic psychological and physiological mechanisms more fully. Fundamental research on learning and memory, especially the learn-

A vast area of opportunity exists here, from the better design of air-traffic control systems to the design of effective robots and aids to sensory capabilities.

NATIONAL BEHAVIORAL SCIENCE RESEARCH AGENDA COMMITTEE

ing of complex procedures, and on topics such as transfer of training from one skilled task to another promise to move us forward.

Much also remains to be learned about how people acquire motor skills, which are critical components of performance in many production settings. Are there better ways to train such skills? In the past, we've usually relied on practice, but practice does not always make perfect; we now know that only correct practice can improve performance. Determining what constitutes correct practice is itself a theoretical challenge. Related issues involve questions such as: How do sensory abilities interact with motor-skill development? Are some skills more critical than others? How much can training systems be improved by assigning workers with particular abilities to compatible tasks?

Similarly, a better understanding of decision-making in complex settings is required for applications ranging from board rooms to military battlefields. Such tragedies as the shooting down of an Iranian Airbus by the *USS Vincennes* in 1988, and American troops being killed by "friendly fire" in Desert Storm, underscore this requirement. We also need a broader research base to help us devise decision aids and expert systems that augment human action. Understanding, preserving, distributing, and enhancing expertise is a problem that has long intrigued psychological researchers. With recent advances in computer models and the mapping of neural networks, we can expect great progress with appropriate support.

As an offshoot of this work, one effort to enhance worker productivity relies on computer-based "expert systems" to assist decision-making. Developing such systems requires finding the appropriate division of labor between person and machine. The "common sense" answer of "the more machine the better" has often had less than optimal results. Research is needed to identify systematic ways to make these divisions so that system designers can capitalize on them. Also, the design of critical technologies for the military and other high-technology organizations will require better understanding of such topics as pattern recognition, memory retrieval, and decision-making.

Understanding how to maximize workers' potential is another major goal. A lesson military psychologists learned in the First and Second World Wars was that worker effectiveness and satisfaction improved, and productivity substantially increased, when individuals were assigned jobs that matched their talents. Accomplishing this match-up falls into two domains: ability testing and task analysis. Testing can produce optimal fittings of employee to task, yes. But to devise an accurate test for the complex jobs of the future requires a psychological understanding of these jobs: the various skills and cognitive processes they require, including problem-solving, organizing, and planning. How can these attributes be assessed accurately and fairly? Current discussions concerning equal employment opportunities and affirmative action give these issues an especially keen edge.

Growing Up: Human Development and Families

In the past two generations, the concept of the family has changed radically. Among families with small children, only about 6 percent follow the once-traditional model of a two-parent family: a father who is employed and a mother who stays home full-time. Understandably, then, balancing work and family life has become, for many parents, an ongoing problem. The stress of having to provide both the income and the care for children, often without social supports, can be acute. Patched-together child-care arrangements often contribute to the stress. These problems prove even worse for single parents, especially women in low-paying jobs who get no child support. High-quality child care is not harmful to young children, but many children today don't get it. Research on the components of an affordable, quality care system in the United States is urgently needed to ensure that the future workers of this country grow up to be emotionally, intellectually, and socially healthy adults.

Many American families are also responsible for the care of elderly parents. Responsibilities vary from helping with financial management to providing in-home care for ill parents on a full-time basis. But it is possible to devise better techniques for helping older Americans be self-sufficient as long as possible. A reasonable investment in such work will have substantial human and economic payoff.

Further changing the nation's social fabric is adolescent employment—a mixed blessing indeed. While working teenagers acquire skills, they also have more money for cars, alcohol, and drugs. Their time spent at work is time not spent on school, which helps explain why employed teens have, on average, lower grades and are more apt to drop out of school. How to help adolescents combine work and schooling is a pressing need, requiring research on how to redesign both schools and work settings.

The Psychology of the Group:
Human Relations and Organizations

Most productive work requires cooperative efforts. A better understanding of group dynamics should help managers improve workers' productivity as well as their sense of well-being. We need research on ways to dissolve stereotypes and the prejudices they engender, to promote intergroup understanding, and to integrate workers from different backgrounds and cultures. Such research must involve workers at all occupational levels. For organizations, a failure to address such matters may cause economic losses. For individuals, discrimination results not only in financial loss but in lower job satisfaction, self-respect, and physical well-being.

Photo courtesy of Federal Aviation Administration

Behavioral science guides technical training programs for high-pressure tedious tasks that depend on human factors such as decision making, perception, and problem solving.

Research conducted since the passage of the Civil Rights Act of 1964 shows that well-designed ability tests can predict job performance and therefore are useful in making personnel decisions about hiring, salary, and promotions. But such tests are not flawless, and they are decidedly controversial and unpopular in some quarters. We need research to enhance the predictive accuracy of these tests as well as the later measurement of job performance, for the latter clearly involves many facets of behavior.

In addition, we need to study further the relation between productivity, job satisfaction, and organizational climate and structure. The results of such research will help resolve disputes, improve bargaining and negotiations, and smooth labor-management relations. We also should learn more about how to introduce new technology, how to reduce resistance to change, and how to redesign work groups.

Leadership—both its development and its improvement—may represent the biggest challenge of all. Nowadays, technology, demographics, and information are almost synonymous with change. In so dynamic a context, business leaders find it increasingly difficult to guide their organizations. It is hardly surprising, then, that only one-third of America's chief executive officers are judged successful, whereas one-third are outright failures. If we can change these figures by better educating our leaders, we will reap handsome returns. We need an investment in research on leadership, the interpersonal and social processes that underlie it, and its development throughout the lifespan. We especially need to examine participative management and collaborative leadership.

Education, Training, and Performance

An advertising slogan proclaims, "It's performance that counts!" And it's true: skilled performance is the hallmark of excellence in every human pursuit, be it in art and literature, athletics, or jobs requiring intellectual, interpersonal, and organizational prowess. But we know far less about developing and maintaining skilled performance than we should. For example, we have yet to gain a comprehensive understanding of the psychological and physical determinants of high-level performance. Research is needed not only on such basic psychological issues as abilities and motivation, but on logistical issues such as matching the demands of work to the abilities of workers.

We need to understand better how to train people. One population in need is unskilled youths, a group noted for high unemployment rates, limited literacy, and poor job-hunting and job-keeping.

We also need to learn how to design better training systems for jobs with increasing cognitive complexity. Modern manufacturing technology often requires employees to work in teams, to rotate through a variety of jobs, to trouble-shoot, and to use mathematical concepts such as statistical quality control. How can people learn to use quantitative information more effectively? Training and performance issues abound for systems that involve distributed work and communications in complex, computer-assisted environments.

As some executives, military leaders, and educators have discovered, however, peak performance does not automatically follow when workers have the skills and training needed to perform a task. The most valuable contributors, be they blue-collar workers or corporate executives, are those who desire to do well and who set high standards for themselves and their co-workers. Much research remains to be done on how the work ethic can be instilled in the young, not only by their families but by schools and the community. Similarly, more attention to conditions that motivate effective performance in the workplace and foster employee satisfaction and morale is required. Research is also needed to identify factors that discourage our youth from developing appropriate attitudes and aspirations.

Behavioral science has uncovered the power of television as an educational medium in infants as young as 10 months. This 14-month old is not simply a passive viewer of televised images of an adult model but is an active recipient of information he demonstrates in an imitation task.

Research into brain mechanisms underlying learning, as well as into formal models of how neural systems change during learning, shows great promise. Expanding this knowledge could enable us to overcome obstacles to learning. Specific information has also become available about cognitive processes that underlie learning and memory: perception, attention, acquisition, storage, and retrieval.

NATIONAL BEHAVIORAL SCIENCE RESEARCH AGENDA COMMITTEE

CHAPTER 3

Schooling and Literacy

Introduction

There is no better way to invest in human capital than to improve our schools. Schools are still asked to perform their traditional functions of passing on critical skills (e.g., reading and mathematics), important facts of our culture (e.g., history and the structure of government), and an appreciation of cultural products (e.g., music and art); and they must also teach basic science and scientific methods. But today's schools are asked to do still more. They must tackle such tasks as teaching about responsible sexual behavior and passing on an appreciation for the contributions of diverse cultures to American life.

Schools must accomplish all this in classrooms often composed of linguistically and culturally diverse students. Further, they must teach more and more students from single-parent families, many of whom were themselves dropouts. The challenge of teaching children in the third generation in the ghetto, or in the second generation in the barrio, or children whose families have access to neither reliable housing nor medical coverage is daunting.

Traditionally, Americans have looked to their schools to help them deal with large social and political issues, from training scientists in response to Sputnik, to ensuring that respect for other cultures be more widespread. Today our schools must prepare millions of youngsters for jobs not yet invented—jobs that are likely to require increased levels of scientific literacy and mathematical skill. Such preparation simply must occur, even though the diversity of students substantially increases the challenge.

Adding to the challenge is our current uncertainty about how to design curricula in a cost-effective and humane fashion. We know that America's children lag behind those from many other industrialized countries in reading, mathematics, and science, but we have yet to understand quite why or how to improve. Our knowledge base is woefully lacking. It is no less so in other areas such as how to teach effective group problem-solving, language learning, and many other topics critical to building effective schools—and citizens—for tomorrow. And even when research endorses some approaches over others, opposition to implementing these endorsements sometimes proves severe. It is a research problem in itself to learn how to persuade decision-makers to acknowledge data and be guided by it.

Colleges of education are in turmoil about how to develop a curriculum for teacher preparation that is both relevant and rigorous. They are also having difficulty attracting minorities to the profession. And the profession itself is losing some of its most talented new teachers within their first few years because of burnout. We need research on all these issues.

Psychological science can play a key role in teacher education, assessment of students, curriculum design, and program evaluation. All are prime research areas. In addition, we need research in designing programs in language learning, in designing computer-based instructional materials, and in how the media affect learning and development.

The Psychology of the Individual: Behavior, Mind, and Brain

While wishing for a "smart pill" may be a fool's desire, we have in fact learned that some mental processing depends on certain neurotransmitters in the brain that are modifiable, sometimes as simply as by changing what we eat. During the past decades a wealth of information has been gained about how the brain learns and remembers. Research into brain mechanisms underlying learning, as well as into formal models of how neural systems change during learning, shows great promise. Expanding this knowledge could enable us to overcome obstacles to learning. Specific information has also become available about cognitive processes that underlie learning and memory: perception, attention, acquisition, storage, and retrieval. One of the key discoveries of the past decade is that there are many kinds of memory and, perhaps, many brain mechanisms for them. This exciting work, occurring under a variety of labels, deserves to be pushed ahead.

Schooling builds on the abilities that a person brings into the classroom. But it is successful only when the information and skills that are provided there can be incorporated, retained, and later used. Research is needed to clarify how knowledge is organized (what, for example, does it mean to say that one "knows" physics?) and how such knowledge is used when solving prob-

Psychological science can play a key role in teacher education, assessment of students, curriculum design, and program evaluation.

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lems both in and outside the classroom. A better understanding of "transfer of training" is crucial, for it will strongly affect how curricula are designed. Also, new techniques for measuring and assessing organized bodies of knowledge are required, including basic work on the nature of measurement devices themselves.

Along with the rest of society, schools now have increased sensitivity to disabled individuals. But to help disabled individuals reach their potential, it's important to deepen our understanding of their disabilities. For example, the nature of dyslexia and other learning disabilities remains unclear since we do not understand the mechanisms that underlie the problems. Inevitably, the emotional status of handicapped children also affects their learning. Understanding how emotions can interfere with learning (and how to overcome this barrier) is an important step toward designing effective programs for dealing with the individual.

A significant part of our collective knowledge is stored in and retrieved from books. Obviously, it is vital that children develop reading skills. Although the importance of literacy is well recognized, we have scant understanding of what happens when we read, how the processes can go wrong, what the consequences are to a reader who speaks a "nonstandard dialect," and a dozen other fundamental questions. How should one best structure a text? How should one structure programs in adult literacy, and how should they be evaluated? Since our standards for literacy are higher than they were only a generation ago, thanks to an increasingly technical work environment, we need substantial research on this most basic, and complex, skill.

Growing Up: Human Development and Families

Children in most countries of the world begin school between ages five and seven. Before then, they are thought too immature—intellectually and emotionally—to bear the rigors of formal education. Of course, there are individual and group differences in maturity and preparation for schooling, and these have raised many issues about school readiness in the United States. Research on individual and group differences has succeeded in describing many of the sources of these differences. More needs to be done, however, to explain them satisfactorily and to pinpoint the actual changes that occur as children acquire basic skills. We also will undoubtedly learn much useful information if we add to our knowledge of valid assessment techniques.

Developmental psychologists are finding that much more learning goes on in infants than was previously thought. They are also beginning to clarify the development that takes place in learning. Such studies merit more support. How do our cognitive faculties mature? In what order do abilities develop? What is the proper sequence in which information and ideas should be taught? Good training experiences presented in the wrong order result in less than optimal education—and may even lead to failure. To date, we have relied largely on trial and error to discover appropriate training sequences. But as the educational requirements of our society increase, and the complex material to be learned expands, a more systematic solution to the problems of instruction is required. Similarly, belief about the value of "tracking" students according to abilities swings back and forth within the education establishment and varies from district to district. Decisions are often made in the absence of empirical data. In order to make wise policy decisions, we need a more thorough understanding of human cognitive development.

The Psychology of the Group: Human Relations and Organizations

Most formal education heavily involves interpersonal relations and group activities. These social aspects of schooling are often complex and varied, involving peers, parents, teachers, and administrators. For example, some schools have active PTA programs; others have none. Parental involvement affects the "atmosphere" of the school and likely affects, at least indirectly, the amount that children learn. But how involvement actually has its effects and how we can stimulate greater parental involvement are areas crying for further study.

Classroom interactions also have not been adequately studied. The social exchanges that take place there are different from those that occur outside the school. Some new research on the nature of "instructional conversations" explains ways in which school

learning differs from family learning. The artificial nature of learning in school—so often seemingly unreal and irrelevant—is quite different from the learning that occurs outside of school, such as learning how to fix a car or balance a checkbook. Understanding these differences could lead to more relevant and exciting schooling. In addition, studies of real-life learning versus school learning makes clearer the school culture, a system with its own rules and language that must be mastered for success. We have learned that not all students and parents understand the rules for successful participation in schools. Studies on how best to pass on that knowledge may help us design more effective programs.

Photo by David Hathcox

A magnet science and technology high school utilizes computers extensively for instruction, a use which requires sophisticated research to determine effects on student achievement.

Education, Training, and Performance

Changes in the curriculum and in what we expect from our schools mean rethinking how to assess school performance. We need to study more deeply than ever before the testing programs that are so much a part of contemporary schooling. If, for example, students are to work jointly on learning projects in computer-rich environments, how will their work be assessed? Similarly, how do we examine the effectiveness of computers, interactive laser-disk technology, and other new additions to schooling? These problems need to be addressed by psychologists and psychometricians. Better means for assessing what our children know and what our teachers teach are needed if the curriculum is to be ready for the 21st century.

Computers will undoubtedly play a major role in the redesign of American education. But only a handful of researchers are currently addressing the key psychological issues concerned with computer learning. We know, for example, that a live, one-on-one tutor can make a huge difference in the amount learned by students; and some recent work suggests that even advanced mathematical and problem-solving skills can be taught by sophisticated computer tutors, which are one-on-one but hardly live. But, in a rush of enthusiasm, school systems often buy computers that they don't know how to use for instructional purposes, and they create or buy software that turns the machines into electronic workbooks as boring as the paper ones they replace. Both to stretch school dollars and to spare children electronic drudgery, psychological studies are needed on the components of effective computer tutoring and other potentially important uses of these devices. We might study, for example, the effects of writing with a word processor. Will it—can it—lead to a nation of better writers? And what of the effects of the computer on attitudes toward learning, on thinking about problems, on organizing information when doing a report, or on the quality of poetry that is written with one? The effects of computers on student achievement cry out for rigorous, conceptually sophisticated examination.

Photo by David Hathcox

Psychological research on effective teaching methods has contributed significantly to the improved efficiency of educational curricula, programs, teaching, and student achievement.

Photo courtesy of Denise Park - University of Georgia-Athens

Research on specific types of memory failure in older adults will, among other benefits, improve medically based diagnostics, aid the development of behavioral treatments, and enhance our understanding of the neural bases of memory.

Recent work has uncovered new memory systems in humans, but the implications for these systems in aging are as yet unknown. We are also still at an early stage of understanding memory deficits associated with various disorders of our aging population . . .

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Photo © 1989 - Walter Urie

Animal research on aging — including memory function, social behavior, and sensory and neural prosthetics — will prove invaluable to elderly humans and to society in general.

CHAPTER 4

The Aging Society

Introduction

With the average age of Americans steadily increasing, more and more families will face problems related to aging parents and grandparents. Although considerable research now shows that not all negative consequences of aging are inevitable and that some changes have adaptive significance, the aging population does have special needs. These needs guide us to special research topics that must be addressed if we are to provide our aging citizens and their families with the highest quality of life.

The Psychology of the Individual: Behavior, Mind, and Brain

Motivational and emotional changes accompany aging. These changes have been largely ignored by the research community. Whether changes in motivation and emotion stem from the altered availability of neurotransmitters in the brain, or from changes in other bodily processes, or simply from changes in life circumstances is not yet known. Similarly, we do not yet know enough about the life-long effects of stress, nor about the individual's ability to mobilize psychological and physiological resources to cope with it. We should develop better animal models for studying the changes in emotional and motivational processes that accompany aging. These model systems get around the difficulty of manipulating such processes in humans.

At the microscopic level, various important matters associated with aging need addressing. One concern is life-span changes in the structure and organization of the brain. Grasping such changes can illuminate both the development of psychological capacities and their loss with age. Various forms of memory need to be distinguished and linked to their neural substrates. Using modern brain-imaging techniques during psychological tasks will permit a clearer understanding of where the various brain functions are located and how they change with age. We may even see the effects on brain structure of drugs and alcohol—even after years of abstinence. An understanding of the psychobiology of aging, such as changes in the operation of the different brain systems that underlie mental processes, may permit developing some behavioral and chemical interventions to lessen deterioration.

Many elderly citizens take multiple prescription drugs. They and their families often wonder about the untoward consequences of doing so. Since there is potential harm associated with multiple drug use, the influence of combinations of drugs on psychological functioning urgently requires further research.

One hallmark of aging is the need for glasses, hearing aids, canes, and other devices. It is important that we better understand the basics of sensory systems and how they change with age. For example, our ability to drive safely is a function of our sensory systems, as well as of our ability to make sound judgments. Likewise, one of the great fears of the elderly and their families is an accident-a fall and a broken hip-and the entering into a nursing home that often follows. A better understanding of how we both see and feel where our bodies are, and how such sensations change with age, may permit the development of mechanical aids or other means of protection.

It is rare to find someone in middle age who does not believe that his or her memory already shows signs of malfunction. Recent work has uncovered new memory systems in humans, but the implications for these systems in aging are as yet unknown. We are also still at an early stage of understanding memory deficits associated with various disorders of our aging population such as Alzheimer's disease and Parkinson's disease, and disorders that accompany strokes and other accidents to the brain. Only with improved understanding of basic memory processes will we be able to expand treatment and rehabilitation.

Growing Up and Growing Older: Human Development and Families

Aging itself is the subject of important developmental research. In the last 20 years more has been learned about the behavioral aging process than in the preceding century. Psychological science has contributed significantly to the new research, especially with respect to cognitive development in adulthood and aging. Although speed declines, wisdom increases with age and experience. Recognizing and capitalizing on the increasing, rather than the decreasing, skills of the elderly will help us improve their adaptation and their contributions to society.

In addition to studying cognitive transformations, we should devote resources to examining the social and

. . . the changing face of the job market will necessitate updating the skills of these workers, as well as retraining workers displaced by changes in the demands for various occupations. Understanding more about effective retraining, especially as it applies to special populations, is a critical research area.

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emotional changes that come about with aging and their effects on families. Relationships between parents and their children change as children pass into adulthood and parents into old age. While mutual obligations persist, the balance of responsibility shifts to adult children, especially to daughters and daughters-in-law. This additional responsibility assumed by women who typically also have children to rear can be onerous, particularly because these women also frequently work outside the home. Little research has been done on the nature of adult children's relationships with their aging parents; even less is known about what social supports are needed by women who are sandwiched between care of their own children and responsibility for their aging parents and in-laws.

An especially poignant phenomenon of which we are only now becoming aware is "elder abuse"—the emotional or physical maltreatment of the old by members of their own families. The kinds of services needed to protect the elderly and to provide help and advice to families need exploring.

Equally poignant is the emotional isolation that often occurs with the loss of a spouse or admission to a nursing home. Applications from basic cognitive and neuro- and social-psychological research will likely improve the quality of life for the aged population in at-home care, nursing homes, and other community settings. Finally, the psychological aspects of hospital and hospice care need further research to provide a more humane response to people nearing the end of life.

The Psychology of the Group: Human Relations and Organizations

A compassionate society is interested in both the psychological and the physical well-being of its elder citizens, including those in nursing homes. The elderly suffer more than their share of psychological impairments. Depression, loneliness, and despair are brought on not only by illness and by depletion of financial resources, but also by increasing social isolation, which, in turn, decreases the capacity to be productive and independent. The vicious circle can be broken only by our understanding the effects of isolation and how to overcome them.

Some years ago, in studies on animals, a researcher reported a special "relaxing" response in a dog to the presence of a person. More recently, the other side of this effect has begun to be studied in the elderly. We now know that comfortable contact with a dog or other pet helps the health and coping ability of the older adult. Likewise, data from foster grandparent programs suggest that young children can have a similar effect. It is not entirely clear why this is so. However, these observations provide us the potential for gaining insights into the nature of human supportive relationships, especially for the elderly. What is the role of touch? Of mutual affection? Of control and responsibility? What are the underlying physiological mechanisms? These and related issues merit attention at the conceptual and empirical levels.

Education, Training, and Performance

Because federal law now forbids employers to require employees in all but a few occupations to retire at a set age, the proportion of older workers will grow in the decades ahead. Meanwhile, the changing face of the job market will necessitate updating the skills of these workers, as well as retraining workers displaced by changes in the demands for various occupations. Understanding more about effective retraining, especially as it applies to special populations, is a critical research area.

We also need to learn how to maintain high-level performance and complex skills in older people, particularly those whose occupational responsibilities affect the lives of others. The need to know more about the effects of the aging process on motor skills, decision-making, judgment, and other areas may be most obvious for such professionals as physicians, lawyers, and engineers, or for those whose performance affects the safety of others, such as bus drivers and workers in nuclear power plants. But in fact we need to know more about how to maintain effective performance for all occupations from semi-skilled to executive.

CHAPTER 5

Drug and Alcohol Abuse

Introduction

When parents talk about their children, a common concern is how to protect them from the use—and abuse—of alcohol and drugs. The problem is enormous. And since all drug use is a behavior, if ever a problem spanned the subdisciplines of behavioral science, this is it. Many facets of it are crying out for fresh research—from knowing more about the brain mechanisms of reward, to learning how to set up educational programs, to devising social support systems that work for adolescents.

Better understanding will come only with a broad-based approach that spans the spectrum of psychological science. If the uncertainty of present-day diagnostic and treatment procedures and the scarcity of efforts to develop more effective techniques became more widely known, there would be a clamor to redirect research efforts in this direction.

The Psychology of the Individual: Behavior, Mind, and Brain

Starting at the level where psychology interacts with biology, many important issues need study. Chemical dependency involves activating complex neurotransmitter systems in the brain that underlie our responses to what are initially pleasant experiences. Dependency is maintained in part through the tolerance that the brain develops to the drug, which then requires more doses to produce the same effect as well as to stave off withdrawal. But some drug-taking occurs in anticipation of withdrawal rather than in response to withdrawal itself. Thus, we must study the basic brain systems that underlie reward, tolerance, and avoidance, and learn how these physical changes translate into behavior. Because individuals differ greatly in these physical processes, understanding the differences, including their genetic bases, may help us pinpoint who is most at risk for chemical dependency.

Similarly, understanding the brain mechanisms of reward will yield insight into the basis of continued drug use. Of central importance here are the changes in neurological function that accompany long-term exposure to drugs of abuse. This concern is of special interest with respect to the impact on the fetus of the mother's-or even the father's-use of alcohol and other drugs. Here is the source of a new and devastating class of developmental disabilities.

In cognitive psychology, at least two major lines of research promise large payoffs. One involves determining the effects of drugs—both in the short term and in the long term—on learning, memory, thinking, perception, and mood. Effects can show up years later, even after long abstinence. Effects also show up in the children of drug-abusing pregnant women, which makes this a long-term problem indeed. We also need to understand the normal processes of learning and memory so that the mechanisms affected by drugs can be isolated.

Research on social factors that contribute to alcohol abuse in this simulated bar are adding to an effective public arsenal in drug abuse prevention and education efforts.

A second research goal is understanding the decision-making that leads to drug-taking, as well as understanding what maintains its use. These are learned behaviors, so a better understanding of such learning is required, especially since different classes of drugs affect different brain mechanisms. It may prove that learning and cognitive mechanisms vary with different drugs. If true, different treatments will have to be developed for various classes of abused drugs.

Since drug abuse (other than alcohol abuse) seems chiefly a problem of the young adult, we need epidemiological studies to tell is about the beginnings of drug use, the factors that maintain use and lead to abuse, and the transition to disuse.

Growing Up: Human Development and Families

One of our most recent and urgent social problems is the plight of babies born to mothers who use crack cocaine. Current estimates are that some 20% to 25% of urban infants now being born were exposed before birth to drugs that have damaging neurological and behavioral effects. Because crack addiction among pregnant mothers is a new phenomenon, we know little about its long-term effects on their children. Early evidence suggests, however, that drug exposure *in utero* has lasting consequences on the child's ability to give sustained attention to tasks and to learn in school. Extensive follow-up studies of such children are urgently needed, as is design and evaluation of treatment programs for them.

Prevention is obviously preferable to treatment, especially when completely successful treatment may be impossible. Young women who use drugs clearly need drug rehabilitation programs before, not just after, they become pregnant. And such programs need to be evaluated in objective, sophisticated ways. Teaching pregnant women to cease drug use cannot rely on mere exhortation. Like other addicts, they need programs of intensive intervention. Developing more effective treatment programs for diverse groups of drug users will depend on careful research and evaluation of treatment effectiveness.

Teenagers are at special risk for drug- and alcohol-abuse, problems which are primarily *behavioral*. Teenagers take larger risks than adults, in part because they use poorer judgment in assessing those risks. Further research is needed on the nature of adolescent thinking about risky behaviors. Effective educational programs based on that knowledge must be developed.

Children reared by alcoholic parents show problems caused by their parents' often erratic, irresponsible actions. They are also potential abusers themselves. Effective treatment programs will likely take the whole family into account. Research on family dynamics and interactions is of great importance, for such work will generate fresh ideas for designing and evaluating better programs.

The Psychology of the Group: Human Relations and Organizations

Individuals develop their sense of self-worth in a social context. This explains why perceptions of how others evaluate them often drive individuals to engage in behaviors, even risky ones, that are valued by peer groups. Drug use is valued in some social contexts, so peer pressure can lead to consequences that are damaging personally and to society at large. It will be difficult to decrease the incidence of drug abuse—and to design effective educational strategies to deal with it—without understanding the relevant group dynamics and cultural forces at work. Studies of such group dynamics may be cost-effective when applied to just this one area of social concern. Also, the efficacy of possible types of community-wide interventions designed to avert first-time drug abuse needs exploring.

One popular belief is that most drug abuse, especially alcohol abuse, is a response to stress—a kind of coping effort by an individual-to deal with emotional demands. Another popular belief is that some individuals have "addictive personalities." Still another is that certain individuals, being physiologically hyper-reactive to everyday stress, are more susceptible to the effects of certain drugs. As yet we have little scientific data to support any of these popular notions. If they have validity, we not only need to demonstrate the fact but to learn more about the role of stress and how to mitigate it. If they have no validity, we need to know it so that our attempts at intervention can be more effective.

Education, Training, and Performance

Simple slogans aren't sufficient to prevent experimenting with drugs, especially in at-risk populations. What is needed are educational programs, aimed not only at children and adolescents—those who are most vulnerable to becoming drug abusers—but at parents, teachers, employers, the clergy, and community leaders. But, as noted, we do not know what form such programs should take if they are to be most effective. Clearly, such programs need to reach many youngsters who are no longer in school. Does the "celebrity approach"—famous people telling youngsters not to use drugs—actually work for this group?

To date, the research devoted to designing, implementing, and evaluating educational programs has been scanty, and the conceptual frameworks employed have too often been simplistic. Research is needed to both clarify and expand appropriate conceptual frameworks, and to devise practical programs that can be delivered effectively to the target populations.

The public has spoken, saying that drug abuse is one of the most frightening problems of our time. The loss in productivity due to drug and alcohol abuse is enormous; so, too, are the medical and insurance costs. Safety in the workplace is also compromised by drug use, leading to great costs to employees, employers, and the public.

Alcohol and drug abuse are primarily behavioral problems. While recognition of this fact is growing, many of its implications have not been adequately appreciated. One is that additional, sound research is needed to develop improved behavioral techniques for both prevention and treatment. Such techniques will not be the equivalent of "miracle drugs." Nonetheless, in terms of the vast costs associated with alcohol and drug abuse, the potential savings associated with investments in behavioral research are immense, not to mention the value of saving many families from despair.

CHAPTER 6

Health

Introduction

Health concerns everyone. Health issues, physical and mental, are central to many of the national problems discussed here, including drug abuse, aging, and violence. No matter what measure is used, unhealthy behaviors contribute significantly to the burden of illness in our society. These behaviors include the use of nicotine, alcohol, and other drugs; lack of exercise and poor diet; bad judgment that results in accidents; and especially responses people often develop to the everyday stresses associated with home and job. Health scientists therefore investigate not only the traditionally defined physical and mental illnesses, but also the newly emerging links between body, cognition, and behavior. To guide research that will ultimately benefit all Americans through both increased longevity and better quality of life, we must recognize the value of a bio-psychosocial model of health.

Balanced funding among the components of this model is essential. For example, investigating how cancer spreads from the lung to the brain without also studying smoking as a behavior is an inefficient use of scarce resources. Likewise, research on cholesterol and heart disease without research on dietary behaviors and coping with stressful life events is shortsighted.

Photo by David Hathcox

The most effective smoking cessation techniques are the direct result of behavioral research on learning and have been enthusiastically adopted by the medical community.

The Psychology of the Individual: Behavior, Mind, and Brain

It has been proved in recent years that emotions influence health, whether physical or mental. Stressed individuals are more prone to disease and more resistant to treatment; they are also more prone to psychological disorders such as anxiety and depression. Stress also influences the course of many of even the most severe of mental illnesses. An exciting new field, psychoneuroimmunology, has combined three major psychological disciplines—psychophysiology, social psychology, and cognitive psychology—in exploring emotion-disease links. We are beginning to learn that a rich interplay exists between behavior, brain, and immune functioning.

Advances in brain-imaging and other brain-localizing technologies, which reveal brain structure and brain function, have given us the opportunity to link thought, perception, and behavior to specific areas and pathways in the brain. Much more work is needed to identify these links, but many advances in understanding are already reported for schizophrenia, autism, dyslexia, and Parkinsonism.

Recent research also shows that some personality traits, attitudes, and motivational processes are related to disease. For example, hostility has been linked to general disease proneness and, in particular, with cardiovascular disease. Still other personality traits have been shown to relate to good health or "hardiness."

Attitudinal and motivational processes affect disease outcomes. Attitudes may either increase or decrease the effects of daily stresses. They may even determine how well individuals with specific threats to well-being survive. We need to identify more precisely these health-related personality traits and to determine the extent to which they stem from genetic and environmental factors.

Being sick often means taking medicine to get well. Curiously, however, compliance with instructions on taking prescription medicine is often low. An amazing number of sick people never even get their prescriptions

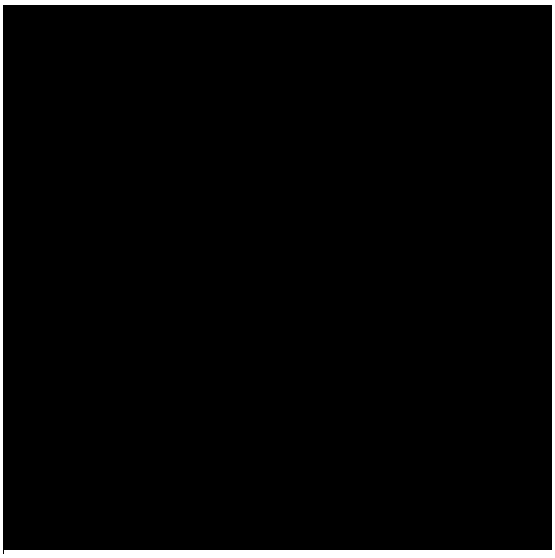

Photo courtesy of C.E. Izard - University of Delaware

Research on infant physiological correlates of emotions and temperament can allow better design of mental health early intervention and prevention programs.

filled. Compliance with medical treatment is a significant research topic to determine how we may improve health.

The National Institute of Mental Health sponsors major research initiatives in the area of major mental illnesses, most notably depression and schizophrenia. Both genetic and environmental factors affect their incidence. Psychologists in the burgeoning field of behavioral genetics play key roles in assembling the reliable family histories and in the search for genetic markers. Other psychologists, in neuroscience, in psychopharmacology, in biopsychology, in clinical research, are trying to uncover critical factors in these illnesses. Still others attempt to identify environmental features that contribute to these diseases. Many of the newest ground-breaking findings about the major mental illnesses have been made by psychologists. If given increased opportunity, these scientists will play an important role in discovering both physical and social factors that can reduce the incidence of such illnesses. Here are just a few examples.

In mental health, biological advances have increased the emphasis on the role of behavioral science. For instance, there are recent findings that some children of schizophrenic parents have the same distinct cognitive features, and that these features can predict when schizophrenia may begin in these children. This has offered us a new lead to solving the riddle of the genetic contribution to this dreaded mental illness. These early cognitive features may represent a clear genetically transmitted trait that controls the later onset of schizophrenia. But many unanswered questions in this research remain, and a great deal of work is needed on this cognitive aspect of schizophrenia.

Another gap in mental health exists in that certain drug therapies and certain behavioral therapies have proven effective in the treatment of depression. Yet, very little is yet understood about the underlying mechanisms which would explain the similar effects of these very different approaches. Research in this area would likely open the path to still more effective treatment and prevention of debilitating depressive disorders.

Finally, studies of individuals who have experienced major trauma such as rape, early sexual abuse, combat, and catastrophic disaster, have all emphasized a certain memory loss known as dissociation in dealing with these and subsequent related events. Yet, the understanding of dissociation is still in its primitive stages. Much work is needed to understand more completely how the brain organizes the information it gets from life's experiences and how the lowered functioning of these victims can be relieved.

Growing Up: Human Development and Families

Low birth weight is one of the most expensive health problems in the human life span. It usually stems from prematurity, which in turn often stems from poor prenatal care. Ironically, the United States holds the poorest record of prematurity and infant mortality among minority infants in the entire industrialized world.

While medical issues have been addressed through exciting improvements in the care of very underweight infants, behavioral science must learn why the mothers failed to get adequate prenatal care, thereby causing the problem in the first place. For still unknown reasons, *many pregnant women do not participate in prenatal care even when services are readily available and even when they are free.* How can pregnant women be motivated to make use of these facilities? Equally important is the need to understand why so many pregnant women engage in behaviors harmful to their developing fetuses.

In childhood, accidents rank as the greatest source of injury and death. Accidents stem from behavior; they are behavioral problems of children and their caregivers who fail to provide a sound environment. For example, a child may eat a poison that ought to have been stored out of reach, or another child falls on a hard surface that could have been made softer. One example of a successful preventive measure is the use of a child car-seat, now mandatory in nearly all states. Still, 40% of American parents do not consistently use a seat—or fail to strap their infant in correctly. More behavioral research is needed to improve the training of caregivers and children in accident prevention.

Adolescents have a well-deserved reputation for risk-taking that results in accidental injuries, sexually transmitted diseases, and other health problems. They often exercise too little and have poor diets. Concern about appearance is leading many adolescent girls to develop anorexia nervosa and bulimia, with serious implications for their physical well-being. The problems are nearly all behavioral. We need research on adolescent motivation and decision-making to reduce harmful behaviors.

Many mental health problems of children have direct implications for their mental health as adults. Children suffering from, say, autism, depression, or childhood schizophrenia require extensive care if they are to function adequately later in life. Far more common are children with antisocial behavior problems. As adolescents and adults, they often cause severe problems both for themselves and for society. While research shows that such children's behavior problems can be diagnosed in the preschool years, current treatment programs have not proved particularly effective. Better means of treatment must be found through research.

On the other hand, children who we know to be at risk for adult mental disorders, such as the children of schizophrenic or depressed parents, require more research on prevention of disorders rather than treatment after the disorders occur.

Interestingly, some children manage to resist the bad influences of their disadvantaged environments, whereas many others succumb to them. Resilient children have the uncanny knack of overcoming poverty, abuse, and neglect—sometimes by finding a mentor in the school or community, and sometimes through their own intelligence or personality. We need to know more about such children so that others can be helped to escape similar circumstances.

The Psychology of the Group:
Human Relations and Organizations

Psychologists have discovered that the quality of individuals' social support systems contributes significantly to their treatment, recovery, and relapse from physical or mental disease. Now we are also learning that the quality of an individual's relationships and social support system may influence susceptibility to certain diseases in the first place. We need to analyze exactly how these variables have their effects.

Certain diseases, like mental illness and AIDS, often result in their victims being stigmatized. Such stigmas affect the quality of the victims' interactions and relationships, both socially and occupationally, and may even affect full access to health care. Understanding the causes of social reactions to these victims, and learning how to influence them more effectively, will help reduce the impact on victims.

Education, Training, and Performance

How do we get people to stop behaviors which are counter to health? How do we get them to do something so seemingly simple as complying with instructions for taking oral medication? Answers to these questions have proved elusive in the past, even when they were directly addressed. But recent, more complex, models of attitudes, self-efficacy, and self-regulation hold promise for answering such questions.

Similarly, research is now developing techniques that can be taught to patients for coping with anxiety. Understanding better how such training has its effects will permit more rapid application of these techniques to other disorders.

Recent research with the chronically mentally ill has emphasized the importance of social skill training in reducing the chances of a relapse. More research is needed to determine how these initial successes can be tailored to more individuals.

Patients and their families can also be educated about the nature of a major depression and reassured that in most cases it is treatable. The tragedy of untreated depression continues to be told even in current times and within well-educated families. Other major illnesses are also important areas of focus for behavioral scientists. It is worth emphasizing that currently the most effective methods to prevent AIDS require persuasive psychosocial and behavioral intervention.

CHAPTER 7

Violence in America

Introduction

Violence—or fear of violence—stalks us all. It is a determinant of where we choose to live; it dominates the local news; and it carries staggering societal costs. Every family member, from a grandparent who fears being mugged on the streets to a child who may attend a school in which police patrol the halls, can be affected by the escalating violence in America.

Our traditional approach to combatting it—hiring more police and building more prisons—has been found by many communities to be prohibitively expensive, and ineffective even when the money is spent. Court dockets are clogged, indicted offenders who fail to show up for their trials are often not pursued, and convicted offenders are often returned to the streets after a token incarceration in order to relieve prison overcrowding. Recidivism is the rule, not the exception.

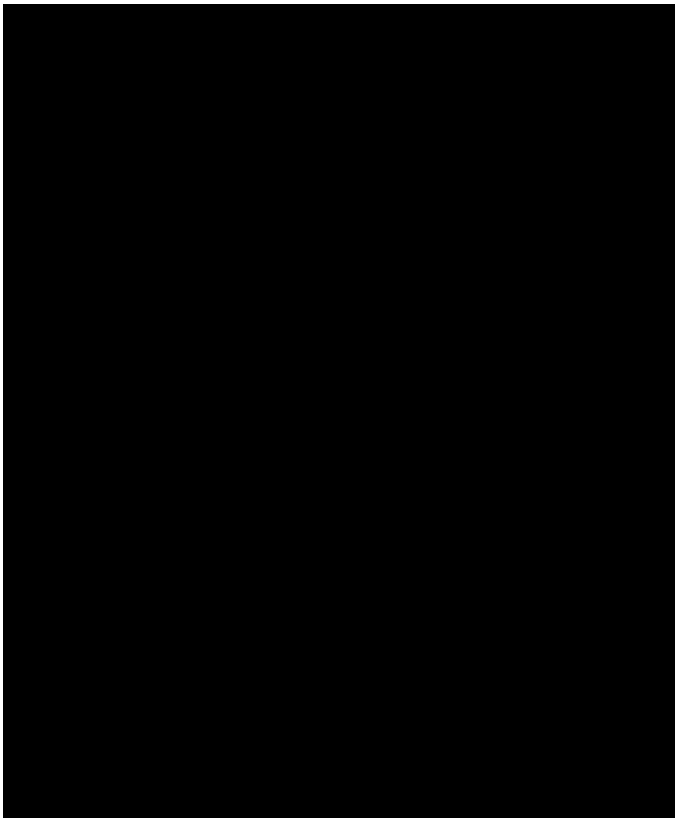

Photo by David Hathcox

Productive behavioral research is uncovering facts — about criminal behavior and rehabilitation, judicial efficacy, and social correlates of crime — that can drive government policy toward more systematic, effective, and cheaper crime prevention and treatment strategies.

We need a better understanding of the causes of violence, both within and outside the family, as well as better preventive techniques. We also need to develop effective treatment alternatives. Plotting rational ways to cope with violence requires developing new knowledge, basic and applied. The research challenges include devising better training programs for police who must deal with domestic violence (one of the most hated calls that police officers receive), dealing with intergroup conflict that often results in individual and gang violence, predicting recidivism, and understanding both the social-psychological conditions that breed violence and the psychobiological wellsprings of violent behaviors.

The Psychology of the Individual: Behavior, Mind, and Brain

The biology of emotional behavior is an active area of research. Scientists are beginning to identify structures and connections in the brain that are involved in fear, aggression, guilt, and shame. Psychopharmacological studies, meanwhile, are identifying brain systems that are important for regulating the emotions and associated behavior. Within this framework, psychobiological approaches to understanding and minimizing aggression have become possible.

From animal studies, we know that tendencies toward aggression vary with the individual, and that they are to some degree inheritable. The human genetics of aggression and related personality characteristics, such as impulsivity and psychopathy, urgently needs further study. Some researchers believe that violence can be a form of the thrill-seeking that is especially common in males during late adolescence and early adulthood. This possibility and the biological basis of thrill-seeking itself need exploring.

It appears that some forms of violent behavior moderate with age, most predictably as individuals pass into their forties. Hence the common notion that "The best cure for violence is time." But the actual basis of this age-related change—altered psychological, hormonal, or physical strength parameters—has not been established. A clearer understanding of it could significantly affect our treatment of offenders.

Growing Up: Human Development and Families

Aggressive and delinquent behaviors develop in predictable patterns that differ for boys and girls. Most males are more physically aggressive than most females, even as toddlers. Similarly, antisocial behaviors are more common among boys throughout childhood and adolescence. For both boys and girls, however, physically aggressive, delinquent behaviors accelerate from late childhood through middle adolescence, then decline in late adolescence and adulthood. But of the large numbers of adolescents who commit delinquent acts, only 5% to 10% become adult criminals.

The dramatic shifts from adolescent to adult aggressive patterns have not received much study, so questions remain. How can behavior problems be diagnosed early enough to prevent adolescent delinquency? How can adolescents who are already delinquents be diverted from adult criminal careers? How can early environments prevent violent outbursts in some young people? Can high-quality day care help abused and neglected children to grow into more constructive adults?

Family violence remains one of the most disturbing problems facing America today. Assaults by men upon their female partners is rampant. Surprisingly, though, spouse abuse remains poorly researched. We need to know how such aggressive behaviors develop, how they are evoked in particular situations, and how such a pattern of violence is sustained over a long-term relationship. Behavioral research is at the heart of understanding and solving these problems.

Child abuse, including sexual abuse, is another pandemic problem in America, in part because children who have experienced abuse or witnessed the abuse of one parent by the other often grow up to be abusers themselves. The perpetrators are most commonly members of the family and, in many instances, otherwise respectable, lawful members of their community. What factors within the person and situation lead to their behavior? Can it be stopped without breaking up a family that may have redeeming strengths? What kinds of techniques should be used with girls and boys to minimize the immediate emotional trauma and its long-term effects? Preventing and treating child abuse of all kinds depends on firmer research than we now have.

Violence in this country is now the leading killer of young African-American and Latino males. Stopping this violence, which is frequently gang-related and which often harms innocent bystanders, requires better understanding of its personal and social origins. Drug abuse is often a complicating factor. But too little research has been done on the family and social structures in minority communities that could help stem the violence among adolescent males and its often lethal consequences.

Through behavioral research, violence on television has been implicated in America's development of an emotional immunity to acts of aggression. Children who watch a great deal of violence on TV are less likely to recoil at the violence of others; some are even more likely to commit violent acts. That some children choose to watch violent television programs and are influenced by them, whereas others are not, suggests some characteristics of children that make them more prone to the attractions of violence. We need to identify those characteristics.

The Psychology of the Group: Human Relations and Organizations

Our whole understanding of group aggression must be deepened if we ever hope to spend less on jailing violent criminals, as well as on aiding the victims of violence. We need to discover how to promote conflict resolution between small groups (such as families), larger groups (such as adolescent gangs), and those still larger groups defined by their race, ethnicity, religion, or even nationality.

It is no secret that stereotypes and prejudice underlie much inter-group violence in America. Thanks to good psychological research, our understanding of the processes by which negative stereotypes are established and maintained has increased remarkably over the past two decades. And many stereotypes and prejudices, especially racial and sexual ones, have softened of late. Even so, we are only now appreciating the subtle, unconscious ways in which prejudice can linger. Likewise, with the breakdown of some of the more serious forms of racial inequality, we face the possibility that intergroup conflict may actually increase rather than decrease, particularly where economic disparities remain large. The psychological principle that frustration causes aggression was articulated nearly 50 years ago, yet we've seen little systematic work anchoring that principle and testing its application to the severe social problems we confront.

We also need a better understanding of socially based cognitive processes that are sources of aggression. Distortions and selective memories for socially charged events may lead to violent behavior (e.g., a mother's misinterpreting her child's inability to follow some command as an act of defiance, or miscommunications between merchants from one ethnic group and customers from another).

Equally needed is research into the social and

cognitive processes that arise in the wake of violence. Selective memory on the part of witnesses to an event may bias their recall and courtroom testimony, and may be inadvertently worsened by authorities' attempts to obtain accurate recollections. Techniques for promoting accuracy in recall are being developed, but need to be refined. This need is particularly urgent in the case of children who may have been sexually abused by relatives and other trusted adults.

Education, Training, and Performance

Violence is often transmitted between generations. Children learn to behave aggressively from seeing the aggression of their parents toward each other—or toward those outside the family. We need to develop programs in which adolescents and young adults are taught parenting skills and more constructive ways to deal with future spouses and peers.

With poor urban youths, meanwhile, violence among rival gangs may stem from boredom and a conviction that they will never escape their impoverished circumstances. We must find better ways to teach the skills necessary to get and hold good jobs. Also, techniques must be developed to instill in these young Americans a sense of obtainable goals. We must find ways to motivate them to stay in school and to cultivate work attitudes necessary for reaching these goals. While there is much talk about these problems, systematic study of them remains scanty.

Photo courtesy of Ann Howard - Leadership Research Institute

Photo courtesy of C.E. Izard - University of Delaware

The cost to society of the problems discussed here is in the hundreds of billions of dollars. Investing in psychological research to deal with them, including basic research that has implications for many problems at once, has the potential of immense returns.

NATIONAL BEHAVIORAL SCIENCE RESEARCH AGENDA COMMITTEE

Photo courtesy of D. Washburn - Georgia State University

CHAPTER 8

Summary

This is an exciting time in psychology. Work on both basic and applied problems—and work done at many levels of analysis, from brain-behavior relations to group dynamics—is making great progress. Equally satisfying, work that was initially conceived as basic research has often found almost immediate direct applications. By the same token, practical problems have stimulated new ways of thinking about mechanisms underlying behavior. Across the entire spectrum of work—from basic to applied—we have seen important advances. But such progress is not nearly fast enough, considering the urgency of the social challenges we confront.

The cost to society of the problems discussed here is in the hundreds of billions of dollars. Investing in psychological research to deal with them, including basic research that has implications for many problems at once, has the potential of immense returns.

This document has described several topics of critical national importance, and it has noted some of the ways that psychology can address them. In every case we can identify major research issues for all four of the key perspectives of modern psychology: individual behavior, cognitive processes, and brain mechanisms; human development and the family; human relations and social organizations; and education, training, and performance. Supplementary reports will lay out a more detailed set of research initiatives.

This effort is founded on the belief that there is a path to progress. Research in psychology, both basic and applied, can contribute importantly to solving national problems affecting every family in America. The Human Capital Initiative will permit psychological science to make such contributions.

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