# BASIC BEHAVIORAL SCIENCE RESEARCH
## FOR MENTAL HEALTH

### A NATIONAL INVESTMENT

### A REPORT OF THE
### NATIONAL ADVISORY MENTAL HEALTH COUNCIL

NATIONAL INSTITUTES OF HEALTH • National Institute of Mental Health

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U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES
Public Health Service
National Institutes of Health
National Institute of Mental Health

# ACKNOWLEDGMENTS

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NOTE: This report is the result of deliberations of the National Advisory Mental Health Council and reflects the professional judgment of this advisory body. The NAMHC recommendations do not necessarily reflect Administration policy.

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PROLOGUE

# PURPOSE AND ORIGINS OF THIS REPORT

To improve our Nation's mental health, the National Institute of Mental Health (NIMH) supports a wide range of research related to the etiology, diagnosis, treatment, and prevention of mental disorders. The Institute's advisory body, the National Advisory Mental Health Council (NAMHC, appendix A), periodically surveys needs and opportunities in specific research areas relevant to the NIMH mission. In the recent past, NAMHC reviews have mobilized NIMH resources to develop promising research initiatives in schizophrenia, mental disorders of childhood and adolescence, basic neuroscience, and research on services for people with severe mental illness. In a similar vein, this report is expected to provide guidance for the Institute's basic research programs concerning behavioral and social factors that promote mental health or contribute to mental disorders.

We are pleased to share this NAMHC report with the leadership and program staff of NIMH and other components of the National Institutes of Health (NIH) and the Department of Health and Human Services as well as interested policymakers and professional and public groups throughout the Nation. It offers an overview of progress and promising lines of basic behavioral science[1] research and highlights aspects of that research

requiring the Institute's special attention and stimulation.

Behavioral and psychosocial factors play a critical role in both physical and mental health and illness. Thus, NIMH has funded basic research in these areas since its inception. In fact, NIMH's first research grant in 1947 was awarded for a behavioral and neurological study of the learning process. Basic behavioral science research, like other types of basic research (e.g., neuroscience research), does not produce immediate clinical applications. Yet basic research is the wellspring for clinical progress. During the past few decades, the growth of scientific knowledge about basic cognitive and motivational mechanisms, emotional and personality development, and interpersonal, family, and cultural factors has profoundly changed our understanding of normal and abnormal behavior. The wisdom of those basic research investments is reflected as well in the vast number of clinical settings and programs that now use behaviorally oriented methods to assess, treat, and rehabilitate people with mental disorders and to prevent those disorders.

It is important to note that NIMH encourages and supports a far broader range of behavioral science research topics than those described in this document. This report focuses on basic behavioral science research within the existing scope of NIMH's Division of Neuroscience and Behavioral Science. It is directed particularly to research

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[1] Throughout this report, the term "basic behavioral science" includes a wide range of topics in psychology and related sciences (e.g., linguistics, ethology) as well as research domains often described as social science, such as sociology and cultural anthropology.

that addresses psychological and social factors affecting the normal behavior of the whole person (or organism) rather than physiological subsystems.

To conduct the extensive review process leading to this report, NAMHC appointed a Steering Committee consisting of two behavioral scientists (Drs. Gordon Bower and John Kihlstrom) and four Council members (Drs. Jeanne Fox, James Jackson, Joseph Matarazzo, and James McGaugh). The Steering Committee enlisted the help of 12 other experts in behavioral science to serve on the ad hoc NIMH Basic Behavioral Science Task Force, which was convened especially for this review. The Task Force was directed to identify priority research areas with high potential for advancing basic knowledge that can aid in understanding, treating, and preventing mental and behavioral disorders.

Following initial planning sessions, the Task Force divided its work among six topic-based subcommittees. Each subcommittee included five to seven eminent behavioral and social scientists and was cochaired by two members of the Task Force. Dr. Stephen Koslow, Director of the Division of Neuroscience and Behavioral Science, as well as program officers of that Division, worked closely with each subcommittee. The Steering Committee members, chairs and members of the six subcommittees, and participating NIMH staff are listed in appendix B.

The subcommittee members wrote and exchanged concept papers in their specialties and met as a group to discuss the merits and priorities of various lines of research. Because the review was restricted to normative behavior of the whole person, it did not include studies focused primarily on neurophysiology, psychopharmacology, health psychology/behavioral medicine, or any studies of clinical populations and clinical treatments. At times, however, examples are drawn from these areas to illustrate the broader relevance, clinical and research linkages, and potential contributions of basic behavioral science research.

For this report, the Steering Committee selected illustrative topics from the many significant lines of current research in each major area. This sample is expected to convey the nature of the important scientific questions currently under investigation, along with some interesting and relevant findings and challenges for future research. While the printed word cannot capture the generous spirit, dedication, and enthusiasm of the behavioral and social scientists who participated, this report integrates many of their discussions and written contributions.

INTRODUCTION

# Basic Behavioral Science Research As a Resource for Mental Health

Striking progress has occurred recently in understanding the origins of mental disorders and developing more powerful ways to diagnose, treat, and prevent them. However, mental illnesses still present major challenges to millions of affected Americans, to the resources of our health and welfare systems, and to the mental health research community.

According to current estimates, more than one-fifth of all adults in the United States suffer from mental disorders in any given year. For most of these people, the disorders are relatively mild and brief. But about 5 million adult Americans—2.8 percent of the adult population and possibly a similar proportion of children and adolescents—suffer from severe mental illnesses such as schizophrenia, bipolar and unipolar affective disorder, schizoaffective disorder, autism, panic disorder, and obsessive-compulsive disorder.

In 1990, mental disorders of all types cost the Nation an estimated $148 billion. This figure includes treatment costs of $67 billion—10 percent of the total annual direct cost of health care in the United States. It includes, as well, the social costs of these illnesses, which collectively reduce life expectancy, lessen productivity, and increase demands on both the social service and criminal justice systems.

Economic data alone cannot begin to account for the enormous suffering borne by people with mental disorders and their families. Their pain is exacerbated by the societywide misunderstanding, fear, and stigmatization that still afflict people with these disorders and often limit their access to the social supports, services, and resources that can help them.

As this report on the past achievements and future trajectory of basic behavioral science research illustrates, this broad and diverse area of inquiry, in conjunction with many others supported by NIMH, can be expected to contribute significantly to reducing these economic and emotional costs in the future.

## Past Achievements

Since its founding nearly five decades ago, NIMH has had a deep and productive commitment to basic research in behavioral science. That commitment has produced enormous benefits, changing how we understand ourselves and others, how we raise and educate our children, and how we manage our individual and group relationships.

Compared to what was known only a few decades ago, the current base of behavioral science knowledge is almost unrecognizable. For example, learning is no longer viewed as the passive acquisition of stimulus-response associations but rather as the active generation of predictions and hypoth-

eses concerning forthcoming events. Likewise, perception turns out to be more than the flow of stimulus information from peripheral receptors to the brain. Rather, it reflects a complex interaction between levels of processing in the brain and the rest of the body. Our understanding of how people think, reason, and make judgments and decisions now challenges the belief in human rationality that had prevailed for more than 2000 years. We have an entirely new view of the nature of unconscious mental life and of the reciprocal relations between cognitive and emotional processes.

We now know that the cognitive capacities of infants and young children are far greater than we previously imagined, and we are gaining a new understanding of how emotions develop, come under increasing control, and influence behavior and health. We have discovered the fundamental structure of individual differences in personality, and we now understand better how personality emerges and changes as individuals interact with their environments. Our view of the role of parents and other caregivers is changing dramatically; we are coming to understand the subtle ways parents and children mutually influence one another, how home and school experiences shape self-concept and self-esteem, and why it is important to support people's intrinsic motivation for learning.

We now have greater insight into how social status and social bonds affect people's attitudes and behaviors, including how individuals draw support from those around them and create a beneficial social environment. Our understanding of the role of society in the life of the individual has deepened, as has our appreciation of cultural differences in attitudes, beliefs, and behavior. Research is also revealing why social prejudices and stereotypes are so powerful and long lasting.

Taken together, these advances help clarify what constitutes normal human behavior throughout development. At the same time, they provide new insights into major social problems such as homelessness and poverty, violent and other criminal behavior, high-risk addictive and sexual behaviors, racism and discrimination, family breakup, and academic and occupational underachievement.

This explosion of fundamental knowledge about behavior, combined with equally striking advances in biology, has significantly improved our ability to diagnose and treat mental disorders. As recently as 30 years ago, mental illnesses were shrouded in mystery, difficult to distinguish and diagnose, and even more difficult to treat. Now, many of these disorders can be diagnosed and treated as precisely and effectively as can other medical disorders, and opportunities for prevention are increasing.

Approaches derived from basic behavioral science research with humans and other animals are now core components of the therapeutic options available to clinicians for treating mental disorders. For example, basic research on conditioning and learning has laid the foundation for a widely used group of treatments known collectively as behavior therapy. These include the following:

- Cognitive behavioral therapy for depression and anxiety disorders

- Desensitization and implosion therapy for treating phobias, obsessions, and compulsions

- Self-control techniques for managing eating disorders, smoking, and alcohol abuse

- Panic control treatment to reduce and eliminate panic attacks

- Relaxation and biofeedback training for

reducing migraine headaches and other stress-related somatic symptoms

- "Token economies" to teach social and personal-care skills to people with severe mental illness and mental retardation

Basic behavioral science research also has other successful clinical applications:

- Improved methods of marriage and family counseling

- Special education techniques for people with mental retardation or autism

- More accurate diagnostic procedures for identifying specific forms of brain damage

- Improved validity, reliability, and organization of mental disorder diagnostic categories

- Expert computer systems for rapid acquisition of clinical expertise

- More persuasive techniques of health education and health promotion to reduce risky behaviors related to acquired immunodeficiency syndrome (AIDS), addictions, and other disorders

- Powerful techniques for testing the behavioral and cognitive effects of medications

## The Origins of Mental Illness: The Diathesis-Stress Model

In considering the many factors that contribute to the onset and course of mental illness, one helpful framework is the "diathesis-stress" model. It assumes that an episode of illness is the product of two independent processes: diathesis and stress. "Diathesis" refers to an individual's vulnerability to a

specific illness. For example, a person might be predisposed to develop schizophrenia by virtue of genetic inheritance (suggested by a family history of the illness) or certain constitutional factors, such as abnormal levels of the neurotransmitter dopamine. In a relatively benign environment, the individual might generally perform well, but when pressured by stressful events, the person might lapse into disorder.

According to the model, diathesis and stress are complementary; neither is sufficient, by itself, to produce schizophrenia, depression, or other mental disorders. In fact, someone with relatively little predisposition for mental illness may endure even catastrophic levels of stress without becoming ill. In a highly vulnerable person, however, relatively little environmental provocation is required to precipitate an episode of mental illness. When stress subsides, symptoms of mental disorder may remit and the individual may return to the healthy side of the threshold. Relapse can occur, however, if stress again increases. Furthermore, in some individuals with severe disorders, vulnerability appears to increase with repeated episodes of illness.

Identical twins carry the same genetic-biochemical diathesis for specific disorders, but one may become ill while the other stays well because they experience different levels of exposure to environmental stressors (e.g., malnutrition, oxygen deprivation before or after birth, or various psychosocial factors). Indeed, research has shown that if one twin has schizophrenia, his or her identical co-twin has only about a 40-percent chance of developing the disorder.

Environmental factors also affect recovery rates from severe mental illnesses. One study found that in Denmark, the rate of recovery 2 years after the first episode of schizophrenia was 6 percent, but in Nigeria it was 58 percent. (The issue of sample selection in such studies remains to be fully explored.)

Even within a particular culture, aspects of the psychosocial environment may have substantial effects. For example, we now know that in the United States, individuals who have recovered from schizophrenia are less likely to relapse if they are discharged to a home environment with a positive (e.g., accepting) emotional atmosphere than to one with a negative (e.g., critical) atmosphere.

Diathesis usually has been regarded as biological in nature, whereas stress has been viewed as psychosocial, but this is not necessarily the case. Pessimistic habits of thought, acquired through social learning, may predispose people to some forms of mild but distressing and debilitating depression. Certain biochemical stressors, such as radical changes in hormone levels associated with pregnancy or drugs, may trigger negative moods and loss of energy. When these biochemically induced changes are interpreted through the filter of a pessimistic mental set (diathesis), an individual may develop a full-blown episode of clinical depression.

The implications for research are clear. A full understanding of mental health and illness requires a research perspective that includes not only genetic, biochemical, and neurological factors but also the interpersonal and cultural environments in which people live and the mental processes by which they comprehend that world, interpret their experiences, and plan their actions.

## Animals in Basic Behavioral Science Research

Human beings conceptualize, reason, and have language and conscious mental states; in addition, they create social and cultural structures. These features combine to make humans qualitatively different from other animals, and for this reason the largest part of basic behavioral science research focuses on humans. Nonetheless, studies involving rats, cats, birds, monkeys, and many other nonhuman animals—both in their natural environments and in laboratories—are also important components of research on mental health and illness. Such studies are essential to advance understanding in all behavioral and social domains, including emotion, social behavior, and cognitive function. They permit investigators to control a greater number of genetic, environmental, and experiential variables and to examine more extensive manipulations of behavioral conditions than may be done with human subjects.

For example, behavioral studies with animals have provided important insights into learning and the processes affecting motivation, including hunger, thirst, and the need for sleep and sex. Studies such as these permit researchers to examine fundamental behavioral processes apart from the impact of human culture and institutions.

Animal research also reveals strong social influences on biological processes in the areas of sexual, parental, and communicative behaviors. For example, when female rats live together, their ovarian cycles become synchronized; something similar happens in humans as well. Research has revealed that the effects are transmitted among animals through chemicals known as pheromones.

Studies of groups of baboons show that changes in the dominance hierarchy of their social group, such as the entrance or exit of a dominant male, affect the testosterone levels of the males who remain—lowering or raising them, respectively. In certain species of fish, males change their color and size, as well as their mating and aggressive behaviors, in response to sex-hormone changes brought on by the presence or absence of a more dominant male.

Studies of nonhuman animals also show that experiences of "learned helplessness," of the

sort that lead people to develop expectations and beliefs characteristic of depressed patients, actually reduce levels of the neurotransmitter norepinephrine, which is also reduced in depressive illness. This kind of research makes clear that people are not merely puppets pulled by the strings of biological processes; behavioral, mental, and social factors have powerful, reciprocal effects on biological function.

A fuller understanding of the influence of social and psychological processes on biological processes can give us new insights into the mechanisms underlying a variety of behavioral and psychosomatic abnormalities, from eating disorders to ulcers, lowered immunocompetence, and false pregnancy. Basic behavioral science research with non-human animals is essential for these continuing achievements to be realized.

## Cross-Cutting Themes

A number of cross-cutting themes, which recur in the chapters to follow, play important conceptual roles in contemporary basic behavioral science research relevant to mental health and illness, whether conducted with humans or other animals.

- *A developmental perspective.* Mind and behavior do not emerge full blown in an individual; rather, various components develop at different times. Research on development requires long-term observation of individuals. Although development is usually viewed in terms of the life of the individual organism, it can also be viewed in terms of the evolution of the species. Animal studies provide unique opportunities in this respect, because the lifespans of many species are much shorter than those of humans, and changes in developmental patterns over many generations can be examined in a relatively

short time. Because pathology is often the result of faulty development, greater understanding of normal developmental processes is key to planning effective interventions for preventing and ameliorating psychopathology.

- *Comparisons across species and across cultures.* Many basic brain mechanisms underlying human behavior arose millions of years ago. Behavioral comparisons across a range of species tell us something about the evolutionary origins of behaviors relevant to health. For example, the human stress reaction apparently developed to deal adaptively with life-threatening emergencies; however, its persistence into the modern world, with its constant levels of low to moderate stress, has additional consequences: an array of cardiac, intestinal, and mental disorders. In addition, cross-cultural studies of humans can indicate which behavioral patterns represent biological imperatives and which represent cultural options. Whether looking across species or across cultures, comparative research can highlight different, novel, and perhaps more effective solutions to behavioral problems.

- *Individual variations.* Like variations across species and cultures, variations within them are scientifically important. For example, of twins genetically disposed to schizophrenia, why does one become ill while the other stays healthy? Why do some people respond to treatment for manic-depressive illness, but others given the same treatment do not? Why do some children overcome a deprived childhood while others succumb? Basic behavioral science research seeks to understand individual differences as well as general processes.

- *The bidirectionality of causation.* Over time, the study and treatment of mental illness have shifted back and forth be-

tween a "somatogenic" view that mental illness results from diseased brain processes, and a "psychogenic" view that it stems from traumatic experiences and disturbed social relationships. It is now clear that both of these narrow views are outdated. Biological processes mediate behavior, but psychosocial processes can affect the brain, the endocrine and immune systems, and the rest of the body. For example, preliminary evidence from brain-imaging studies indicates that, in people with obsessive-compulsive disorder, successful behavior modification therapy—like successful drug therapy—produces identifiable changes in brain activity. Bidirectional causation occurs within the psychosocial realm as well. Although behavior is the product of the social environment, people often select and then shape that environment through their behavior.

Clearly, understanding in detail how biological, psychological, and social-environmental factors interact to produce behavior is a fundamental task for basic behavioral science research. This knowledge is essential to understand the roots of normal behavior and to reduce the enormous emotional, social, and economic burden of mental illness in America.

Photo by W. Clark

# CHAPTER 1

# EMOTION AND MOTIVATION

A depressed woman participating in a research study was filmed telling a doctor how much better she was feeling in therapy. Days later she attempted suicide. Slow-motion study of her facial expressions while talking to the doctor revealed—hidden among her smiles—the fleeting, almost invisible signs of intense distress. If warning expressions such as these could be detected on a routine basis in patients with severe mental disorders, suicide might claim far fewer lives each year. This example merely hints at the potential of research exploring the emotional and motivational wellsprings of our behavior.

One of the most fundamental and intriguing questions confronting behavioral scientists is: What gives behavior its particular impetus? Nested within this seemingly simple question are many others: How much of our behavior is biologically programmed to aid survival? To what extent can and do we control or override our fundamental biological urges and at what cost? How does emotion affect our long-term individual and social development? How do we acquire and act upon the broad achievement goals that guide our lives? How do specific mental disorders arise from and contribute to disruptions in emotional and motivational processes? How can these abnormal developments be prevented or corrected?

Answers to many of these questions, while still elusive, are becoming much clearer. Behavioral scientists are developing new ways to capture and describe the subtlety of human emotions and motivational states (both of which are usually marked by strong subjective feelings as well as physiological changes). Researchers are also becoming more adept at understanding the biological and social-psychological forces that, together, regulate both normal and abnormal behavior.

Humans share with other animals drives such as hunger, thirst, survival, and sex. Our behavior is also impelled and shaped by psychological motives, such as life goals and aesthetics, that are uniquely human. Animal studies help us to understand the drives we share and lay the foundations for understanding those motives that set our species apart.

## Emotion

Emotion was once regarded as a base instinct to be subdued or repressed. Now scientists increasingly view it as a safeguard of survival and an enrichment of experience throughout development. Emotional expression provides a powerful communication system, one that is especially important early in life before language develops. An infant's cry of distress brings a caregiver running; a baby's beaming smile invites love and care. As development proceeds, voice, face, gesture, and posture continue to communicate feelings to others and to influence their behavior. A scream of fear can cause a crowd to panic; a smile can

*A dense array of scalp electrodes is placed on a volunteer in order to measure event-related brain potentials (ERPs). ERP methods have been used to assess characteristic patterns of affective-cognitive interactions for each brain hemisphere.*
Photo by D. Tucker

sometimes defuse the most dangerous of situations and create instant bonding among strangers.

Yet at times our emotions get out of control and defeat our best interests. Emotions play an integral role in many major psychological disorders—witness the blunted emotional expression seen in schizophrenia, the extreme elation or sadness in manic-depressive illness, the fear in paranoia and anxiety disorders. In fact, "mental disorder" and "emotional disorder" are almost synonymous in everyday language.

Our maturing scientific perspective on emotion owes much to a recent explosion of technology that has permitted researchers to describe and measure aspects of emotional life in unprecedented richness and detail. Using sophisticated monitors, behavioral scientists can now track respiration, heart rate, muscle contractions, facial expressions,

voice changes, brain activity, and other objectively measurable aspects of emotion. Computer-enhanced videotaping permits fine-grained analysis of elusive responses and moment-to-moment nuances in interactions among mothers, fathers, and children. Researchers now use these and other emerging technologies to bring rational understanding to emotion, an aspect of behavior long regarded as irrational.

## Emotional Development

Researchers have found that during early development, the emotional repertoire of humans grows steadily richer and more varied. Newborns enter the world with a small array of emotional expressions, including surprise, distress, and pleasure/joy. By 4 months of age, anger, too, is clearly visible if the infant's movement is restrained. New expressions of emotion, such as fear and shyness, appear after 6 months of age. Later,

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## The Structure of Emotion

A fundamental question for emotion research concerns the issue of basic emotions. The English language contains several hundred different words for describing feelings, but it seems unlikely that we actually experience this many emotional states. Many of these terms represent only very subtle shadings in mood. Which emotions are fundamental?

One research approach to this problem asks subjects to rate their own emotional states on a large number of dimensions such as "happy" and "angry." These ratings are then statistically analyzed to identify those dimensions that are so strongly inter-related that they can be reduced to a single factor that represents what they have in common. Applying this sort of technique results in a very small list of adult emotions, which can be reduced even further to a set of basic emotion categories:

| | |
|---|---|
| Love | Anger |
| Joy | Sadness |
| Surprise | Fear |

Obviously, lists such as these can be further reduced to two groups of emotions: positive and negative. While one would ordinarily think that positive and negative emotions are opposites, apparently this is not the case. That is, people can experience high levels of negative and positive emotion simultaneously.

This finding, one of the most interesting results of emotion research, is consistent with what we know about the biological underpinnings of emotional life. Recordings of brain activity during emotional states indicate that positive emotions are processed in the left hemisphere of the cerebral cortex, while negative emotions are processed in the right hemisphere. The fact that positive and negative emotions are based in different brain systems helps explain why we can feel happy and sad at the same time.

Further evidence for a set of basic emotions comes from cross-cultural research. The facial expressions for one small set of emotions—joy/happiness, surprise, anger, sadness, fear, and disgust—are universally recognized across cultures. These findings correspond fairly closely to the six basic emotion categories (shown above) derived from the analysis of emotional language; only two emotions—love and disgust—are not found on both lists. The universality of these emotions suggests to some investigators that they may be part of our evolutionary heritage. If so, it may be that separate brain systems underlie each of these states, not just positive and negative emotions in general.

more complex emotional experiences, such as empathy, guilt, embarrassment, shame, and pride, enrich the world of feelings as the child gains greater awareness of social standards and develops a more sophisticated self-concept.

Research on children's emotional development and how it may go astray can expose the roots of many mental disorders, including clinical depression, conduct disorder, and attention deficit/ hyperactivity disorder. One line of research, for example, is exploring how children's development is affected by the mental health problems of adults in their family environment. It has shown that mothers with chronic depression tend to be less responsive than other mothers in interacting with their young children. That behavioral pattern may handicap the children's emotional development and may be one factor, beyond genetic inheritance, contributing to the elevated rate of depression found among children of depressed parents.

Studies of early emotional development also

hold promise for predicting and possibly preventing later emotional and behavioral problems and mental disorders. Such studies have shown, for example, that children with high levels of anger and aggression in the preschool years have an increased risk of having behavioral problems, such as extremely high levels of hostility and negativity, during the elementary school years. Based on such findings, cognitive-behavioral intervention studies in preschool, elementary, and middle-school classrooms are exploring ways to augment children's strategies for coping with anger, such as teaching them the verbal and social skills needed to address conflict directly and nonaggressively.

How do we normally learn to control emotion, manage our anger and fear, and overcome sadness? These issues have obvious implications for mental health, and developmental studies are providing some telling answers. One line of study focuses on the emotional lessons conveyed through intricate moment-to-moment interactions between infants and their parents or other caregivers. For example, when a stranger enters the room, an infant is likely to attend to the caregiver's face and tone of voice for emotional cues about how to react. If the caregiver signals fear, the infant shrinks from the stranger; if the caregiver smiles, the infant approaches. If caregivers are depressed and unreactive, or respond chronically with excessive fear or anger, these abnormal reactions may contribute to disturbances in children's emotional and social behavior.

Studies with animals suggest that healthy emotional development requires having a sense of control over events in one's environment. Monkeys who grow up with such control differ in important ways from those reared without it. In one study, a group of infant monkeys was raised in an environment in which they controlled receipt of small food rewards by performing tasks, while another group had no such control. Those who controlled their food rewards later showed less

fear in a potentially frightening situation and more boldly explored a novel environment. More research is needed, however, to determine whether, in humans, a history of control over important environmental events makes some people less likely than others to develop various fears and anxiety disorders.

## Negative Emotion

The unique properties and importance of negative emotions such as anger, fear, sadness, and disgust and the conditions that elicit them have drawn considerable interest. Research consistently shows that negative qualities often command more attention and seem more important than positive qualities:

- As people think over upcoming decisions, potential losses are often given greater weight than potential gains.

- In the social sphere, one negative personal characteristic influences people's feelings about an individual more than a host of positive characteristics.

- Negative experiences color marital satisfaction; they have more impact than do positive experiences.

- People are more likely to find an unusual face in a crowd—and quickly—if the face looks angry than if it looks happy.

- Subjects who examine a description of a person that uses equal numbers of positive and negative adjectives are likely to subsequently recall more negative adjectives than positive ones.

- Humans are "prepared" to learn to react with negative emotions and to quickly learn to avoid certain stimuli, such as snakes, spiders, and angry faces, that may have posed a threat to early ancestors. Although people are able to learn to avoid other stimuli, such as flowers or happy

## Fear of Snakes, Flowers, and Unseen Things

Mammals—including humans—have an inborn capacity to react fearfully to dangerous stimuli, such as loud noises and the sight of certain animals. Squirrel monkeys freeze instinctively at the sight of a snake, as do infant rodents when exposed to cats. The fear response appears to serve as a protective signaling system to help animals elude predators even before they understand the nature of the threat.

Rhesus monkeys born in captivity do not instinctively fear snakes. However, they learn such fear very quickly if they see another monkey being terrified at the sight of a snake, even if they merely see the episode on videotape. A fearful response seems to be "hard-wired" into the brain, but activating it in response to a particular stimulus requires appropriate exposure to a traumatic experience. Moreover, if researchers alter the videotape and show a monkey apparently "fearing" flowers, observer monkeys do not learn to fear flowers; thus, not all fears are learned with equal ease.

Past work led scientists to believe that all emotional reactions to sensory experiences involved the cerebral cortex, where, in humans, thoughts are processed. However, recent animal studies of fear behavior challenge that belief. The amygdala, a mass of gray matter at the base of the brain, can register the emotion of fear without cortical involvement. When a rat hears a fearful alarm, nerve pathways normally carry the signal from the auditory relay stations near the ear up toward the outer layer of cortex (where sensory information is made understandable) and then to the amygdala. But a rat's fear reaction is present even if nerve connections to and from the cortex are severed.

A possible explanation comes from the recent discovery that some nerve pathways can carry sound signals from the ear directly to the amygdala. Messages from the amygdala then trigger the adrenal gland to produce epinephrine (adrenaline), increasing the heart rate and preparing muscle activity for fight or flight. This discovery explains how a mammal can be afraid without understanding why—an experience particularly familiar to humans with deep anxiety.

faces, that did not threaten their ancestors, they do so with greater difficulty.

Being particularly attuned to objects that could potentially be dangerous makes evolutionary sense; in past epochs, such stimuli probably threatened survival. In the contemporary world, this bias to fear such possibly dangerous stimuli can be the source of phobias. Moreover, these negative biases can erode the quality of life, the wisdom of choices, and the longevity of relationships. Knowing that these biases exist may stimulate the development of methods to counteract their potentially destructive effects on social and emotional life.

### The Face and Emotion

The human face is a remarkable system consisting of 44 separate muscles; 4 are devoted to chewing and 40 to facial expression. No other species has such capacity for making faces! Why would nature devote such substantial resources to facial expression?

One function is to communicate feelings to others—often in ways that powerfully influence their behavior. Facial expression also helps us experience emotion. Indeed, some theorists have suggested that without it we could not feel emotions.

Interestingly, the brains of primates appear to be particularly sensitive to faces and their messages. Recent studies with macaque monkeys reveal cells in the brain's visual cortex that are specialized to respond only to monkey faces. Some of these cells respond only to the identity of faces and others only to particular facial expressions. Studies of patients with certain brain injuries

suggest that human brains are also specially adapted to perceive faces; such patients may be unable to recognize anyone's face yet be fully competent in identifying other visual patterns.

It is now clear that extraordinary amounts of information about emotional life—including some of its secrets—can be gleaned by systematically measuring facial expression. Researchers have recently found a way to measure changes in facial muscle tension that are too small to create visible movements. They have now discovered that when normal people merely think about certain mildly emotional topics, such as recalling happy or sad experiences, tension increases slightly in some facial muscles.

One group of muscles is usually activated by positive thoughts and another group by negative thoughts. When people with depression recall happy thoughts, the facial muscles normally associated with happiness show little activity. Another study with depressed patients revealed that as their depression lifts, activity lessens in the corrugator muscle, a large muscle in the forehead that Darwin referred to as the "grief" muscle.

Sensitive facial expression measurement techniques such as this aid in determining subtleties of feelings and attitudes, especially when verbal reports are untrustworthy or unavailable. This knowledge should contribute to better diagnosis and treatment of depression and other emotion-related disorders. Building on a solid foundation of research on facial expression of emotion, a new generation of studies should explore voice, posture, and gesture as vehicles for emotional expression.

### Emotion, Brain Hemispheres, and Depressive Symptoms

The brain's right hemisphere has long been regarded as uniquely involved in emotional behavior. Recent studies suggest that the frontal regions of both hemispheres are involved in interpreting and expressing emotion—with negative emotion processed mainly in the right hemisphere and positive emotion mainly in the left hemisphere. Indeed, a number of studies suggest that the two hemispheres respond differently to positive and negative emotional experiences from birth through adulthood. These findings have changed our views about how the brain works and have deepened scientific understanding of clinical depression and its milder forms.

Researchers have discovered that a very good indicator of people's prevailing level of negative emotion, especially depressed mood, is the relative amount of electrical activity in the left versus the right hemisphere when subjects are sitting quietly with their eyes closed. People with clinical or subclinical depression show relatively more activity in the right hemisphere—particularly in the frontal temporal areas—than do people without depression.

Healthy women who show this abnormal pattern report more negative feelings and have a lower immune system response than do women with the normal pattern. The overall significance of these biological differences for mental and physical health is as yet unknown. Scientists have proposed that people whose right hemispheres are chronically activated may be predisposed to depressive or anxiety disorders and have an increased vulnerability to other types of illness.

## Motivation

In the search to understand the forces that drive and organize behavior, motivation researchers focus intensively on basic biological underpinnings, such as hunger and the need for sleep and sex. They also study fundamental psychological forces that shape

behavior, such as the way humans create and pursue short- and long-term goals. Behavioral scientists examine how these motivating factors impel and regulate behavior, how they interact with other biological and social factors, and what roles they play in a variety of normal and abnormal behaviors.

Much of human behavior, like that of other animals, is concerned with maintaining biological equilibrium in a changing environment and simply staying alive. Many severe mental disorders, such as clinical depression, involve disturbances in mechanisms underlying basic biological motivations, including those involved in behaviors that preserve individual life (such as eating and sleeping) or preserve the species (such as mating and childrearing). Severe mental disorder can also rob people of crucial psychosocial motivations, including the abilities to relate socially to others and to plan, hope, and structure their lives toward future goals. At times, the collapse of such motivation may threaten life itself, as when suicide appears preferable to a bleak future.

## Biological Mechanisms of Motivation

### Eating Regulation and Eating Disorders

Researchers exploring the forces underlying normal eating behavior and eating disorders (e.g., anorexia nervosa, bulimia, and obesity) are drawn to fundamental research questions such as: What determines when, what, and how much individuals will eat? Why is it difficult for weight loss goals to be achieved and maintained? Behavioral research is starting to provide intriguing answers to some of these important questions.

Every day, people and animals vary how much they eat and their caloric intake to adjust to changes in physical activity, outside temperature, and the energy value of the

foods eaten. Eating patterns of individuals often reflect specific patterns of nutritional balance or imbalance (as monitored by the brain and other organs and tissues intimately involved in metabolism). An extreme example is the disorder known as pica, whose victims crave and eat nonfoods, such as clay, laundry starch, and paint chips.

Recent animal research has revealed that calcium-deficient rats are particularly likely to eat substances containing lead, which can substitute chemically for calcium. Thus, when some children and pregnant women eat peeling lead paint, they may be making a misguided instinctive attempt to correct a calcium deficiency (while unwittingly generating unhealthy body levels of lead and possibly creating cognitive deficits). If this hypothesis is supported by further research, it may suggest a nutritional basis for preventing pica and its health-threatening effects.

Biological factors clearly play a powerful role in eating behavior, but recent studies have shown that meals are rarely begun or ended by physiological signals alone. For example, what, where, and when a rat or chimpanzee eats are all strongly influenced by the eating behavior of nearby peers. The rat, like the human, eats foods that it has learned or inferred that other rats eat. In chimpanzees, dietary habits and food-getting skills, including tool use, are learned and even passed from generation to generation.

How much food people and animals will eat is affected by the food's palatability—a factor shaped in part by culture. Laboratory studies reveal that both people and animals eat far more food than their bodies need when the food is tasty, attractively presented, and varied. In fact, all rats will overeat and become obese if regularly given a "smorgasbord" of palatable foods.

Such findings exemplify an important reason for studying animal behavior. When compar-

ative studies show that rats overeat on palatable food and overeat more in groups than when alone, or that chimp dietary habits are culturally transmitted, it becomes clear that animal models can be used to study normal and abnormal behavioral regulation and to develop new intervention methods for behavioral pathology.

Another important research-based insight is that psychological or social experiences that apparently precipitate disorders such as bulimia and anorexia nervosa may act through specific neurotransmitters, such as serotonin, in key regions of the brain. It is possible that in patients with bulimia, an inherent disturbance of one or more neurotransmitter systems causes abnormal appetite regulation. The binge eating and purging that results may help to sustain a vicious cycle of abnormal brain chemistry and behavior. Although psychosocial factors contribute to the onset of these disorders, and psychosocial treatments, such as cognitive behavior therapy, are frequently appropriate interventions, medications also can be helpful in their treatment. Indeed, clinical studies with antidepressant medications that increase serotonin levels in the brain have already shown some promising results.

## Sleep Cycles and Mood Disorders

The cycle of waking and sleeping, one of the fundamental biological rhythms of our lives, is also one of the most telling indicators of disturbed behavioral regulation. Studying sleep patterns helps to define and explain normal sleep, sleep disorders, and the sleep disturbances seen in some mental disorders. It also shows that sleep is part of broader rhythms that involve a person's body chemistry, mental outlook, behavior, and emotion—all interacting with changes in the physical and social environment.

The need for sleep is powerfully motivating, as any sleepy person will testify, and it is a

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## Development of Sexuality and Sex Differences

Years of scientific study have sketched in the basic mechanisms regulating gender differences in mammals and their effects in motivating behavior. These findings have intriguing implications for understanding human sexuality and gender roles. They give rise to a critical developmental principle—hormones and experience interact at various stages of development. Together they contribute to establishing the characteristic brain, body structures, and sexual organs of males and females as well as their characteristic sexual and other behavior patterns.

In mammals, the periods of gestation, birth, and puberty are all critical times in which hormonal secretions interact with environmental stimuli to develop sexual orientation, gender identity, and a large spectrum of sex-differentiated behaviors. During normal intrauterine development, for example, the absence of testosterone in female fetuses leads to later mating reflexes and brain structures typical of females. In both nonhuman and human primates, the abnormal presence of testosterone at critical periods during prenatal development can lead female fetuses to develop masculinized genitalia and possibly behavior that is more typical of males than of females.

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prime example of rhythmic factors that determine behavior. Although sleep can be temporarily postponed, it cannot be delayed for long. Behavioral research has shown that when rats are totally deprived of sleep, they die within 2 to 3 weeks—almost as rapidly as they would if deprived of food.

Pioneering research using physiological

monitoring in sleep laboratories during the past few decades has uncovered the normal stages of sleep, identified a variety of sleep pathologies, and developed many treatments to address those sleep disorders. We now know that sleep is not simply a state of unconsciousness punctuated by dreams; rather, it a regular procession of rhythmic cycles and stages.

Five major sleep stages have been identified in humans, each with a different pattern of muscle tone and electrical activity in the cortex. Dreaming usually occurs in the fifth stage (dubbed "rapid-eye-movement (REM)" sleep because during it, the eyes quickly move back and forth under closed lids). Although sleepers are immobile during REM sleep (except for isolated finger or facial twitches), their heart rate and respiration both become irregular, and their brains become very active.

In mood disorders such as manic-depressive illness or clinical depression, the normal patterns of sleep and its stages are often altered. People with clinical depression often wake up involuntarily in the early hours of the morning and cannot return to sleep. Even when they do sleep, the structure of sleep is often abnormal; they tend to enter the REM sleep stage much sooner after falling asleep than do other people.

Among people with manic-depressive illness, the pattern of sleep disturbance varies with the phase of their disorder. In episodes of depression, they are typically very tired and sleep excessively; in episodes of mania, they are dynamos of activity and barely sleep. These dramatic changes have led many researchers to view this illness as a disorder of the multiple biological clocks or "pacemakers" that regulate brain and body rhythms—especially the sleep-wake cycle.

Recent research findings suggest that the circadian pacemaker, which regulates cycles that recur daily, is indeed unstable; it is constantly resetting itself to a slightly different time in patients with manic-depressive illness. The pacemaker also seems to be readily disrupted in patients with clinical depression. Levels of the hormone melatonin, which is normally secreted in response to messages from the body's major timekeeper, are lower in their brains than in the brains of other people.

Whether the sleep disturbances are causes or symptoms of these disorders remains to be seen. However, several kinds of sleep treatment have been shown to improve the mood of depressed patients, at least temporarily. These treatments include total or partial sleep deprivation and shifting the sleep period (such as moving an 11 PM–7 AM sleep period to 5 PM–1 AM). Research has shown that the timing of sleep may be more important for these patients than the total time spent sleeping. Other studies confirm that treatment with bright light, which is presumed to stabilize the circadian pacemaker, offers another therapeutic option for some patients whose mood disorders, such as seasonal affective disorder or "winter depression," appear to be linked to seasonal variations in daylight.

## Psychological Motivation

Despite the powerful press of biological drives, humans are propelled as well by their capacity to use symbols and to conceive of and plan for the future. Indeed, so intense is the motivating force of these symbolic goals that they may override all biological motivations; many people willingly sacrifice their lives in support or pursuit of an intensely held belief, such as a deep commitment to a religious or political cause.

How do we select the goals that guide our lives? What determines how we set about achieving them? How do we respond when our goals are achieved or thwarted? The answers to these questions are important not only because goals help define us as individuals, but because success or failure in achiev-

ing certain goals is fundamental to psychological adjustment.

## Life-Task Goals

Goals are mental representations of what we want to do, who we want to be, and what we are emotionally committed to. Broad life-task goals (such as "I want to work in an occupation that will benefit humanity") reflect general concerns at a particular period of life; they can be expressed and pursued in diverse ways by different people. Behavioral scientists are specifying how success or failure in meeting such goals affects physical and mental health.

As expected, research reveals that people who reach their life-task goals usually experience less emotional distress, greater well-being, and better health than those who do not. However, research also suggests that simply having certain types of life goals—independent of whether they are achieved—may threaten mental health. One study showed, for example, that people who strive for power (the desire to control, impress, or manipulate others) experience negative feelings and distress more often than do people who value being close to others.

## Achievement Goals

In addition to studying long-term life-task goals, researchers are also examining more specific achievement goals. These more everyday objectives include both "mastery goals" (i.e., seeking to increase personal competence or master something new) and "performance goals" (i.e., seeking favorable judgments from others of one's competence). People with mastery goals usually feel good about trying hard; they often respond to challenges with renewed effort and better performance. In school settings, such people are often described as self-motivated.

People who have only performance goals

often show a range of maladaptive responses, such as avoiding challenges, giving up when a task becomes difficult, and experiencing anxiety and lowered self-esteem. They are likely to have difficulty in acquiring and displaying new knowledge and behaviors, even when their intellectual abilities equal those of people with mastery goals. Researchers are now studying how to increase some people's sense of fulfillment by persuading them to convert performance goals into mastery goals.

## Intrinsic and Extrinsic Motivation

Research is also revealing the contrasting effects of two other kinds of achievement motivation: "intrinsic motivation" (the desire to do something simply because one wants to) and "extrinsic motivation" (working on a task merely to obtain rewards or avoid punishments from sources outside oneself). When people pursue activities for their intrinsic interest, they are especially likely to become and remain fascinated and absorbed by them and feel happy. Conversely, when people concentrate on the external rewards of particular tasks, they experience decreased emotional involvement and negative feelings. Studies have also revealed that higher intrinsic motivation is linked to higher school achievement and psychological adjustment in children, adolescents, and college students.

In adults, intrinsic motivation has been shown to contribute to active, productive engagement in work, play, and creative activities. For decades, researchers focused on differences between creative and noncreative people and on assessing the individual components of creativity. Recent experimental data suggest that other factors also play an important role. Poetry or art work created by people who produced it for its own sake (intrinsic motivation) was judged to be more creative than work by people who were externally motivated (e.g., assigned an art

project by a teacher). This result suggests that the social environment plays a role in creativity by affecting an individual's degree of intrinsic or extrinsic motivation.

## Motivation for Behavior Change

Research on motivation has important applications in the health domains, where more powerful ways are needed to encourage and sustain changes in maladaptive behaviors. Many effective approaches to prevention and treatment have been developed for a variety of physical and mental health problems, but these will not work if patients do not comply with recommendations, such as taking needed medications or exercising regularly or using safe sex practices to prevent AIDS and other sexually transmitted diseases.

Much motivation research, therefore, focuses on the processes that determine whether people will maintain positive behaviors they have recently acquired. Such studies are based on a number of important findings. Two current theories, self-efficacy theory and attribution theory, emphasize the importance of internal factors in behavior change. However, they suggest different but complementary processes that sustain behavioral change.

Self-efficacy theory suggests that maintaining a behavior depends not only on its perceived benefits but also on a person's sense of potential mastery over that behavior. Indeed, research has revealed that people who initially believe they can perform well at a given activity (such as practicing safe sex) will probably continue, while those who lack such confidence, even if they are initially successful, are more likely to relapse. These findings are being applied in several health-related studies. For example, smoking-cessation programs and cardiac rehabilitative exercise programs that focus on enhancing participants' sense of potential mastery seem to be more effective in

maintaining desirable behavior than those that do not.

Attribution theory places relatively more importance on the way people account for their successful behavior change. It predicts—and research has confirmed—that people are more likely to maintain a change in behavior if they attribute it to their own efforts rather than to an external factor or agent. The theory suggests, further, that relapse after hospitalization is less likely among people with chronic mental illnesses if they believe their improvement stems from their own efforts rather than from their medications or hospitalization.

Recent alcoholism treatment studies indicate that how people account for their behavioral change has important consequences for maintaining abstinence. The chances of sustaining a long-term change in drinking behavior are substantially improved when medications (aimed at initiating a change in drinking) are used in combination with relapse-prevention counseling (aimed at teaching people to credit their own efforts and maintain their changed behavior).

Attribution processes are also being tested in new studies of how patients maintain the long-term benefits of treatments for mental disorders. Treatment programs naturally differ in whether they appear to vest control in the patient (internal control) or in the care system and its technologies (external control), just as patients differ in their attributional styles. For example, many people view a medication program as entailing external control, while a self-administered behavioral procedure appears to involve more internal control. However, researchers are finding that the way these procedures are described (framed) to patients can alter these perceptions. A medication program, for example, can be framed to emphasize that patients should comply with the medical regimen (external control) or framed to suggest that

they are competent and can effectively self-monitor their use of medication (internal control). In theory, if treatments are framed to match patients' own attributional styles, more patients would be motivated to continue with desirable treatments and benefit from their effects. Preliminary research suggests that these framing effects do in fact increase people's adherence to their treatment regime.

## Research Directions

Important directions for future research on emotion and motivation include the following:

■ Certain emotional and temperamental traits (e.g., aggressiveness, fearfulness) play a role in behavioral disorders of childhood. Evidence indicates that these traits are present in early infancy and, through genetic and environmental input, develop with age. **Future research needs to explore the connections among the subjective, expressive, and physiological components of these traits.** Findings from such research will help clarify the antecedents of child psychopathology, such as oppositional defiant disorder, hyperactivity, conduct disorders, extreme shyness, and depressive disorders.

■ Many of the accomplishments in emotion research to date were gleaned from relatively short-term studies of distinct and separate age groups. **Research across the lifespan is now needed to determine the continuities across, and distinctions among, the phenomena of emotion (both negative and positive), mood, and emotional traits.** This research is critical for deciphering the emotional responses seen in mental disorder.

■ Disturbances of emotional expression occur in mental illnesses such as clinical depression, schizophrenia, anxiety disorders, and some developmental disorders. Advances in basic emotion research should contribute to improved diagnosis and treatment of these disorders. **Such progress requires the increased use of methods that assess the vocal, postural, gestural, and facial components of emotional expression as well as antecedent conditions, subjective emotional experience, and physiological activity.**

■ Research has not yet fully explored how the interaction of socialization and the maturation of infants' motor and cognitive abilities affects their ability to regulate their emotions. **Studies should examine the emergence of a range of children's coping strategies for controlling their emotions.** What these strategies are, the conditions assisting or obstructing their development, and their ultimately positive or negative psychological consequences hold promise for increased understanding of adaptive and maladaptive interpersonal relationships.

■ The quality of interpersonal relationships, including the interpretation of the intentions and emotions of others, can play a significant role in the development of mental disorders. **Research is needed to clarify how patterns of emotional communication relate to the development, maintenance, and erosion of emotional bonds and empathy between caregiver and infant, between peers, and between romantic partners. Further, to develop appropriate intervention strategies, these communication patterns need to be studied in the context of cultural and socialization processes that may be unique to specific ethnic and cultural groups.**

■ Biological forces that direct and organize behavior have an intimate role in many normal and abnormal behaviors. **Research**

using human and nonhuman species is needed to understand how biologically motivated behaviors such as sleeping, eating, drinking, and mating arise from the interaction of the external environment with physiological factors such as hormones and neurotransmitters. Clarifying these links will advance our understanding of sleep disorders (e.g., narcolepsy, insomnia), mood disorders with circadian-rhythm and sleep disturbances (e.g., manic-depressive illness, major depressive disorder), and eating disorders (e.g., anorexia nervosa, bulimia, obesity).

■ Research has established that gestational hormones organize the parts of the embryo's brain that will be ultimately involved in adult mating behavior. **Future expansion of reproductive behavior research should investigate a broader range of behaviors, increased diversity of hormones and hormonal mechanisms, and a full range of critical timeframes during which hormones and the environment interact to shape behavior.** Elucidating the interrelations of these fundamental biological mechanisms is essential for understanding major public health problems related to sexual behavior and aggression (e.g., child abuse, rape, domestic violence). The results will also inform decisions regarding appropriate therapeutic approaches.

■ Intrinsic motivation for one's life tasks has clear implications for overall self-esteem and psychological functioning.

**Future research should determine the processes involved in developing, fostering, and maintaining intrinsic motivation.** Knowledge of these processes will be critical in addressing current social and mental health problems such as school dropout, delinquency, and antisocial behavior as well as noncompliance with behavioral and medical treatment regimens.

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Photo by A. Rosenfeld

# CHAPTER 2
# VULNERABILITY AND RESILIENCE

Why do some people collapse under life stresses while others seem unscathed by traumatic circumstances such as severe illness, the death of loved ones, and extreme poverty, or even by major catastrophes such as natural disasters and war? Surprisingly large numbers of people mature into normal, successful adults despite stressful, disadvantaged, or even abusive childhoods. Yet other people are so emotionally vulnerable that seemingly minor losses and rebuffs can be devastating—sometimes even precipitating severe mental disorder. Most people's coping capacities lie somewhere between these extremes.

Basic behavioral science research on the nature of and variations in personality is illuminating the sources of these differences and revealing ways to bolster people's ability to deal with life's difficult and painful aspects. Studies to date suggest that there is no single source of resilience or vulnerability. Rather, many interacting factors come into play. They include not only individual genetic predispositions, which express themselves in enduring aspects of temperament, personality, and intelligence, but also qualities such as social skills and self-esteem. These, in turn, are shaped by a variety of environmental influences. For example, through their early experience and bonding with parents or other caregivers, children form expectations that shape later social experiences. These processes of social learning often influence self-esteem and behavior. Advances in behavioral science research are revealing sources of vulnerability and strength in several areas of investigation. Some key findings are described in this chapter.

## Personality Psychology

Some people are shy, others extroverted; some are chronically anxious, others confident. These relatively stable personality traits set people apart as individuals and are the focus of fundamental questions being explored by personality researchers. Such questions include: How, and to what degree, are people psychologically different from one another? To what extent are those differences rooted in genetics, early experience, or current situational factors? What is the basic nature of those differences—that is, how do people differ in perceiving, constructing, and responding to their social environments? How do those differences affect mental health? How modifiable are personality traits? To what extent do these traits override the situation in determining a person's actions?

### Personality, Psychopathology, and Resilience

Basic research on personality differences and their long-term behavioral expression is shedding light on important public health issues such as drug abuse and depression. One prospective longitudinal study, for

example, revealed that some adolescent drug abusers had a distinctive personality pattern that often was identifiable in early childhood. In research more than a decade earlier, these troubled adolescents had been described as restless, fidgety, emotionally changeable, disobedient, nervous, domineering, immature under stress, and overreactive to frustration.

The same study revealed that the personalities of boys and girls who became severely depressed in late adolescence differed considerably during childhood. The boys had been described as undercontrolled, unsocialized, and aggressive; by contrast, the girls were seen as overcontrolled, oversocialized, shy, and introspective. Findings such as these suggest not only that depression has deep roots in early life, but that early personality patterns associated with later depression differ in important ways for males and females.

These differences may reflect the interaction of personality variables with the contrasting pressures society imposes upon males and females; it encourages males to be assertive risktakers but discourages such behavior in females. As a result, the undercontrolled young man and the overcontrolled young woman may be most at risk for later depression. When an already undercontrolled young man is encouraged to engage in risky behavior, his impulsivity may result in many negative experiences that contribute to depression. When an already overcontrolled young woman is cautioned to avoid risk, she may withdraw so much from the social world and its rewards that she, too, eventually experiences depression.

Understanding what can go wrong in personality development is essential; equally important is discovering what can go right— which personality traits contribute to psychological resilience. Research suggests, not surprisingly, that young girls who have been sexually abused usually suffer from lowered self-esteem, an impaired sense of control and competence, and increased negative emotions—all indicative of poor mental health. However, certain personality traits serve to lessen the ravages of abuse. An abused girl who can rationalize, explain, and comprehend what has happened to her and what she can do about it may thereby be able to maintain her feelings of competence. She may even take steps to end the abuse. While researchers continue to seek ways to understand and prevent child abuse, other research on "resilient" children is now focusing on ways to foster and strengthen those personality traits that help children grow up to be psychologically well adjusted, even after the severe trauma of rape.

An important conclusion from recent research is that personality patterns can change for the better under certain circumstances. For example, although patterns of antisocial, deviant, and even criminal behavior have been found to be remarkably stable from childhood through adult life, entering into a satisfying occupation and enriching personal relationships during early adulthood can break this pattern and greatly decrease the chances that deviant behavior will continue. Intervention programs are needed that build on these encouraging findings.

Personality research is helping us understand and prevent both physical and mental disorders. Increasingly, behavioral scientists are finding relationships between certain personality traits and particular diseases. The linkage between heart disease and the "Type A" personality—characterized by hostility, time urgency, impatience, anxiety, and a sense of stress—has received extensive study. One well-established finding is that people who are hostile (the "lethal" component of Type A behavior) are especially prone to develop heart disease. Most important, even when more conventional risk factors, such as heredity, obesity, diet, and smoking, are accounted for, hostility is demonstrably a risk factor for heart disease.

Moreover, an additional link between hostility and heart disease seems to be through a behavioral pathway. Hostile people are particularly prone to behave in ways that jeopardize their health, such as smoking, drinking, and general risk taking.

However, results of an intervention study for Type A people recovering from a heart attack suggest that their destructive personality traits can be changed. In that study, the effects of standard cardiac counseling alone were compared with a combination of cardiac counseling and counseling focused on reducing hostility and other components of Type A behavior. Compared with the control group, those receiving the combined counseling showed reductions in Type A behavior and an almost 50-percent reduction in subsequent heart attacks during a 4½-year period.

## Personality as Traits

Many researchers regard personality as a relatively stable collection of individual traits. In recent years, behavioral scientists have come to agree that most variation in personality across individuals can be accounted for by differences in five broad factors, sometimes called the "Big Five" personality traits:

- EXTRAVERSION: Gregarious, daring, and enthusiastic

- AGREEABLENESS: Affectionate, empathic, and cooperative

- CONSCIENTIOUSNESS: Organized, dependable, and prompt

- EMOTIONAL STABILITY (versus NEUROTICISM): Unexcitable, without envy or nervousness

- INTELLECT: Intelligent, imaginative, and worldly

## Personality Processes

The Big Five personality taxonomy makes it possible to categorize people into a small number of types. It also helps to summarize broad differences among individuals in their overall behavioral tendencies. However, current personality research is also identifying the psychological factors that underlie distinctive individual characteristics. These factors include the concepts people use for interpreting their experiences and their enduring expectancies about what they can and cannot do effectively. Research is also clarifying how such factors influence not only what people experience and feel but also the effectiveness and adaptiveness (or maladaptiveness) of their behavior as they try to cope with life tasks and stressors.

For example, research has clarified the mental strategies that underlie "will power"—regulating one's own behavior to achieve difficult long-term goals. These strategies are the basic components of a well-functioning personality. Even at age 4, children differ appreciably in the strategies they use; some can delay gratification to reach a long-term goal, but others cannot. Following the development of these children into young adulthood shows that these early self-regulatory skills foreshadow other indices of coping and personal efficacy, such as school success and college entrance, years later.

Research on personality shows that a given individual's overall profile on the Big Five traits is relatively stable, consistent, and predictable over many years. However, many individual characteristics change over time and social settings.

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## Emotional Inhibition: Repression

One well-studied personality trait (the inverse of extraversion) is known as "emotional inhibition." It includes both suppression (the conscious inhibition of emotion and thought) and repression (the unconscious inhibition of emotion and thought). At the turn of the century, Freud proposed that inappropriate repression was one of the most important contributors to mental illness. Only within the past 15 years have the measurement techniques become available to examine this phenomenon scientifically.

Through such advances, it is now possible to identify and study systematically the mental health of people who characteristically and unconsciously inhibit their emotions. These individuals, termed repressors, have been found to score low on personality test measures of distress but high on measures of defensiveness (unconscious self-protection). Although repressors do not seem anxious, their high defensiveness scores suggest that they experience distress but are either unaware of it or are denying it.

When repressors are exposed experimentally to a variety of emotion-producing situations, such as reading threatening phrases, they report feeling very little emotion, yet they display large physiological reactions, such as changes in heart rate, blood pressure, and skin conductance. People who are not repressors have similar physiological responses when they are exposed to emotion-provoking situations and told to inhibit any overt display of emotion. Thus, the very act of suppressing overt emotional expression—whether done unconsciously or consciously—apparently causes a sharp rise in cardiac reactions.

Research clearly demonstrates that habitually inhibiting emotions can pose a threat to physical and mental health. For example, repressors have an increased risk for impaired immune system functioning and a wide variety of health problems, including atherosclerotic disease in men, cancer, and psychologically linked symptoms such as headaches and abdominal pain. Experimental studies have also shown that writing or talking about traumatic experiences and expressing one's emotional reactions may enhance physical health and immune function and lessen use of medical services.

## Emotional Inhibition: Shyness

The roots of individual personality and physiological reactivity can be seen very early in development in the characteristic patterns of sociability, activity, and emotionality known as "temperament." These patterns include being active and outgoing or shy and inhibited. Researchers have discovered that 15 to 20 percent of all infants are shy. When faced with novel or moderately challenging situations, these inhibited infants and children typically escape rapidly, cover, and hide. If forced to remain in the situation, they reveal higher levels of stress hormones and sympathetic nervous system activity than do uninhibited children.

Although some people who are shy as children spontaneously become less inhibited as they grow up (and others seek change through counseling), others seem to retain this temperamental trait throughout their lifespan. Most shy individuals appear to lead relatively normal lives, but severely inhibited children have an increased risk of developing various childhood and adolescent anxiety and depressive disorders. They are also more likely to have close relatives who have been diagnosed as clinically anxious or depressed, suggesting that there may be a familial basis for shyness.

Dramatic individual differences in temperament have been found among monkeys and apes as well as among humans; these differences may be a general characteristic of

many animal species. Rhesus monkeys exhibit many of the physiological and behavioral patterns seen in humans, and as with human children, 15 to 20 percent of monkey infants are shy. These patterns, which are seen in the first weeks of life, appear to be relatively stable from infancy to old age.

Animal studies using selective breeding and biological parent/foster-parent comparisons indicate that although shyness is partly heritable, it can be modified substantially by early social experiences. In monkeys, inadequate mothering, for example, seems to exaggerate both behavioral and physiological features of shyness. Rearing by especially nurturant "foster mothers" encourages the infants to overcome their natural shyness. Not only do they cope with the usual stressors more effectively than do inhibited peers raised by their own mothers (demonstrating more exploration away from their foster mothers and less behavioral disturbance during weaning), they even surpass their uninhibited peers! Moreover, inhibited female monkey infants who receive this increased nurturance later develop into especially nurturant mothers themselves.

# Sources of Personality Variation

## Behavioral Genetics

What is the source of individual differences in personality traits? Are they determined solely by genes, or are they molded solely by the environment? During the past two decades, behavioral genetics research on the heritability of personality traits has shown that neither extreme is correct. Studies of twins, adoptees, and ordinary families have demonstrated that genetic factors only moderately influence individual differences in most personality dimensions and that environmental factors are also important.

When the approaches of behavioral genetics and developmental psychology are combined,

some novel findings emerge. For example, longitudinal studies of childhood temperament and early adult personality strongly suggest that personality stability over time stems more from genetic factors than from environmental constancy.

However, other studies suggest that genetic influences are dynamic—being activated at different times in life. For example, researchers have recently discovered that in newborns, individual differences in temperamental patterns such as activity level and irritability do not appear to be influenced by genes. Yet genes may influence these very same temperamental characteristics later in development. Scientists are now trying to understand how dynamic gene expression across the lifespan influences behavioral continuity and change.

Other issues currently under investigation concern genetic analyses of features of social life once considered to be "obviously" environmental in origin, such as divorce. Research suggests that many presumably social experiences can, in fact, be influenced by genes, which probably act indirectly through their influence on personality. Investigators have noted, for example, that pairs of identical twins are more likely to have the same divorce status than are pairs of fraternal twins, suggesting that genes may contribute to personality characteristics compatible with marriage.

To understand the mechanisms that link biology and behavior, more research is needed on the biological ties between genes and personality. Progress in this area will be helped by findings of the NIH Human Genome Project, an ambitious attempt to map human chromosomes and to discover genes relevant to health and disease.

## Experience and Environment

Ironically, studies in behavioral genetics provide strong evidence that the environ-

ment is influential in shaping behavior. Such research has shown, for example, that identical twins often have very different personalities, suggesting that environmental factors play a considerable role in personality differences.

Another important finding is that many key environmental influences on personality are experienced differently by the various members of a given family. For example, for siblings growing up in the same family, the shared family environment seems less important for some aspects of intelligence and personality than is the unshared part (e.g., a child's unique relationships with parents and peers). Thus, a fruitful research direction would be to assess directly how the psychological environment varies across time and across individuals within a family unit.

Psychologists have found that many behaviors, such as aggression and altruism, that are often attributed to people's personality traits are also influenced by situational and environmental factors. For example, children who observe aggressive behavior on television are more likely to behave aggressively toward others, especially when frustrated, than those who have not seen such models. In one long-term study, researchers found that—after controlling for baseline aggressiveness, intelligence, and socioeconomic status—the extent of viewing of TV violence at age 8 predicted the seriousness of criminal acts committed by age 30. This finding may have important implications for understanding and preventing the transmission of violence.

## Attachment

Some of the most fruitful explorations of the close personal relationships moderating vulnerability and resilience involve studies of attachment, the special bond between infants and their caregivers. This relationship evolved both to meet the new-born infant's obvious physical needs and to provide security in the face of a complex and potentially dangerous environment.

When an attachment relationship is effective, the primary caregiver provides both a secure base for the infant's explorations and a safe haven the infant can return to when frightened, tired, or hungry. The more secure infants feel, the more willing they are to explore and interact with the physical and social world. As their physical and mental capabilities grow, infants increasingly direct their attention and activities away from their primary caregiver—as long as that person remains available in times of emotional need. When such emotional needs are not met, fear prevails and interferes with infants' exploration and interaction with others.

## Consequences of Attachment Quality

Researchers have found that differences in infant attachment security, as measured on a brief behavioral test, can have long-term mental and emotional consequences. For example, children classified as securely attached to a caregiver during infancy will later approach problem-solving tasks more positively and with greater persistence than will children who are insecurely attached. Children with secure attachments also are likely to be more empathic, compliant, unconflicted, and generally competent in their relationships with adults and peers. Children with insecure attachments tend to have trouble relating to other people because their behavior is often either hostile and distant or overly dependent. These tendencies may extend into adolescence and adulthood, influencing significant social relationships as well as basic attitudes toward life.

Some researchers have hypothesized that the success or failure of an infant's early attachments establishes a cluster of expectations (internal working models) that set the stage

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for future social relationships. Some insecure and unhappy infants, for example, may have difficulty learning to deal with and trust others later in life.

An intriguing body of evidence from both human and animal studies suggests that early attachment relationships may be especially significant for later development of parenting skills. Some people who were neglected or abused as infants seem to have problems caring for their own children.

Other findings suggest a link between early attachment difficulties and risk for adolescent and adult mental health problems. Better understanding of the nature and extent of such links should aid in developing effective treatment and prevention programs for mental illness throughout the lifespan.

Researchers have been keenly interested in determining how differences in early attachment security arise. A key factor, according to the most widely accepted view, is the caregiver's sensitivity and responsiveness in interacting with the infant.

Building on such findings, one study found that, after a year of infant-parent psychotherapy, mothers of infants who had been anxiously attached showed greater empathy and were more interactive than untreated mothers of similar toddlers. The therapy focused on alleviating the mothers' psychological conflicts about their children and on providing individually tailored information about child development. While the therapeutic effects need further validation, in this study the children of the treated mothers became more sociable and less angry than the children of the untreated mothers.

## Insecure Attachment and Psychopathology

How much does the quality of attachment in infancy contribute to later personality and

mental illness? Answers should become much clearer in the next decade, as researchers piece together a developmental story that is still unfolding. Data are just now being collected on the psychological health of a group of adolescents and young adults whose attachment relationships were studied 15 to 20 years earlier during infancy.

There is already evidence that severely disordered early attachment relationships (as seen in cases of physical or sexual abuse and neglect) are significant risk factors for certain mental disorders, such as borderline personality disorder. Research suggests that insecure attachment in infancy predicts childhood problems such as difficulties in peer relationships. Compared with children who were insecurely attached to their mothers at 12 months, those with more secure attachments at that age were more resilient and cooperative, happier, and more likely to be leaders at 3 and 6 years.

The long-term mental health impact of various types of disturbed attachment has been examined through longitudinal studies of families affected by depression or maltreatment as well as families receiving therapy focused on low social support and certain behavior problems in children. Some major findings from these studies follow:

- Among children from low-income families, those who had been insecurely attached during infancy were, at ages 10 to 11 and 14 to 15, more dependent, less socially competent, and had lower self-esteem and resilience than those who had been securely attached. This study demonstrates striking consistency in individual adaptation between infancy and adolescence.

- Preschool children who had been maltreated by their parents were more likely than their peers to develop "fragmented attachments" in which, in a parent's pres-

ence, the child displays disorganized or disoriented behavior.

- Two-year-old children of mothers with major depression or manic-depressive illness had a higher proportion of insecure attachments than children of mothers with minor depression or no mood disorder. At 5 years of age, the children with disorganized attachment showed marked increases in hostility toward peers. Parental depression may contribute to children's insecure attachment through its influence on aspects of parent-child interaction and on broader aspects of the childrearing environment, such as the psychological unavailability of the parent during periods of depression.

# Self-Concept and Self-Esteem

Like the concept of attachment, the concept of self is central to our understanding of mental health and illness. In fact, attachment disturbances often contribute to poor self-concepts. Progress in several research areas (e.g., self-regulation and perception of control, self-efficacy, and cultural influences on the self and identity) depends on understanding the factors and processes that regulate and occasionally distort people's self-concept. Research is clarifying how self-concept develops and functions normally, how the process can go awry, and what can be done to prevent or treat many forms of psychopathology (including borderline personality and sociopathy) that may be linked to disturbances of self-concept.

Researchers have concluded that, contrary to intuition, individuals have not one but several views of their selves, encompassing many domains of life, such as scholastic ability, physical appearance and romantic appeal, job competence, and adequacy as a provider. Further, self-esteem is often affected by social comparisons.

Studies in the academic domain have revealed, for example, that the self-esteem of African American students is higher in schools where they are numerically in the majority than where they are in the minority. The social comparison process that presumably contributes to these findings should be studied directly, however, since such research results have major implications for intervention. Other studies have revealed that, beginning in junior high school, many young girls reportedly feel inadequate in math, science, athletic ability, and physical appearance—a distressing set of findings that also deserves further exploration.

Researchers have discovered as well that, among a group of unpopular children, those deemed aggressive had relatively inflated self-esteem and overestimated their attributes and abilities in academics, appearance, athletics, and peer relations. By contrast, unpopular and withdrawn children had more negative—but accurate—conceptions of themselves, perhaps acknowledging their own deficiencies in social relationships. Children who are aggressive and unpopular are at increased risk for behavioral problems and juvenile delinquency, whereas withdrawn, unpopular children appear to sustain their low self-esteem through late childhood and are at increased risk for depression.

## Pathways to Self-Esteem

Self-esteem begins to develop early in life; it has been studied in children as young as 7 years of age. As children learn to describe aspects of themselves, such as their physical attributes, abilities, and preferences, they also begin to evaluate them. Becoming self-aware was once regarded as a uniformly positive step in development—a path to insight about one's own character. Recent research suggests that excessive self-awareness can interfere with concentration on important tasks in school, job, and social relationships and may undermine self-

esteem. Indeed, overly harsh self-evaluation appears to be one cause of depression and suicidal behavior. Further study is needed of the boundaries between positive self-awareness, which can provide insights and promote healthy change, and negative self-consciousness, which can interfere with one's development.

Research findings have refuted the idea that a person's level of self-esteem is established in early childhood and remains stable throughout life. In many individuals, self-esteem changes dramatically over time. Long-term studies reveal that major transitions (such as marriage, parenthood, and job loss or promotion) are likely to provoke changes in self-esteem.

During the transition into junior high school, high school, or college, for example, the self-esteem of many students plummets. Some of them no longer feel competent scholastically (although they still value academic excellence), and others fail to gain the support of their new peer group. Still other students may respond to a school transition with enhanced self-esteem; they feel more competent in domains they value or they find themselves in a very supportive peer group.

The relationship of ethnicity and culture to self-esteem is complex. While one's ethnicity per se bears no natural relation to one's self-esteem, psychological factors associated with experience as a member of a particular ethnic or cultural group will influence self-esteem. However, across various ethnic populations, the same factors enhance children's self-esteem: their abilities in activities such as sports or academics that their culture values and the social support and approval of significant others.

## Contributors to Low Self-Esteem

Low self-esteem plays an important role in mental illnesses. Research on self-esteem is beginning to explain interpersonal factors that lead people to devalue themselves, to become depressed, and even to consider suicide. Such factors include their assessments of their physical appearance, the behavior of parents and other caregivers, and the school environment.

### Judgments of Physical Appearance

Beginning in preschool and continuing into middle age, people's evaluations of their physical appearance are inextricably linked to their self-esteem. Indeed, physical appearance is all-important, even in specific situations where one might expect other attributes—such as intelligence in a learning-disabled group—to be paramount. Cultural and media messages about the importance of good looks as a measure of self-worth appear to contribute strongly to our excessive valuation of physical appearance. People whose self-esteem depends on their appearance and who seek to reach standards of attractiveness (especially for women) that are virtually unattainable are vulnerable to low self-esteem, which in turn may contribute to the life-threatening eating disorders associated with slenderness, namely, bulimia and anorexia nervosa.

Research has uncovered important individual differences in the links between self-esteem and assessments of attractiveness. Beginning at age 4, some children's self-esteem depends on their view of how they look, while for others, self-esteem is independent of appearance. The former orientation has been shown to be particularly pernicious for girls; as a group, they report more dissatisfaction with their appearance and more depressed mood than girls with the latter orientation. Greater knowledge about the factors underlying these different perspectives on the self should aid in encouraging young people to adopt standards for self-

worth that are less superficial and less threatening to mental health.

### Childrearing Practices

The behavior of parents and other caregivers also influences the early development of self-esteem. Recent studies reveal that children of depressed mothers, in particular, are at risk for low self-esteem, depressed mood, and lack of energy to engage in activities that foster physical, intellectual, and social development. However, more must be learned about which specific aspects of the parent-child relationship, in addition to genetic factors, contribute to these effects.

### School Environment

A new line of research indicates how changes in the school environment influence self-esteem and motivation for learning. As children move from elementary to middle, junior, and high school, the school environment becomes increasingly more competitive and impersonal. In addition, growing emphasis is placed on social comparisons and scholastic ability.

The negative impact of this environment is most serious as students enter junior high school. Just as children are becoming more self-conscious, the emphasis on social comparison escalates, leading many students with lesser abilities to notice their deficiencies and possibly become "turned off" to school. Similarly, just as adolescents are trying to develop greater autonomy from their parents—and therefore need other adults to support their self-esteem—attention from teachers becomes less abundant, less personal, and more focused on the students' academic performance. These findings suggest that broader intervention efforts in schools, communities, and institutions outside the family may encourage a more positive self-concept in children and adolescents.

The finding that many women have a diminished sense of self-esteem compared with men invites further study of the social and other factors that contribute to this important difference. For example, in one long-term study, researchers found that during the adolescent years, self-esteem tends to increase in boys and decrease in girls. In another study, conducted at an all-women's college that became coeducational, women's self-esteem levels decreased after men were admitted. Following the men's arrival, the women also participated less in class discussions and showed less interest in the academic subject matter of their classes.

Such findings call for more research on how environments, including coeducational and same-sex school settings, influence and alter self-esteem. Since not all students are negatively affected by entering junior high, researchers may be able to reliably identify those whose self-esteem decreases, determine what factors and circumstances contribute to that outcome, and discover how to prevent that loss.

## Research Directions

Important directions for future research on vulnerability and resilience include the following:

■ Research has revealed that low self-esteem plays a powerful role in depression and eating disorders. **Future research should explore the developmental pathways leading to low self-esteem and its maintenance.** These pathways include comparisons to others in scholastic, athletic, social, and physical appearance domains. Self-esteem is also affected by specific socialization processes transmitted by parents, peers, schools, and the media. This is a vital research priority given the fact that low self-esteem is associated with self-destructive actions and antisocial behaviors.

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■ Considerable research suggests that complex relations exist among coping strategies, ethnicity, and culture. **More research is needed to clarify different cultural orientations and define those cultural strengths that maintain a solid sense of self among members of ethnic minority groups, collectively and individually.**

■ Personality assessment can be useful in determining possible antecedents of mental illness as well as the outcomes of interventions intended to improve mental health. **Future research in personality evaluation should move beyond the use of self-report questionnaires to the more frequent inclusion of judgments by other informants and observations of behavior in natural settings and in laboratory settings that can provide concurrent psychophysiological recordings.** Such research will have practical applications in the prediction and diagnosis of psychopathological behavior.

■ **More precise theories of personality and more sophisticated and broadly based assessment tools must be developed to follow for extended periods individuals with specific personality patterns.** Such studies can reveal how, when, and under what circumstances these patterns lead to harmful life outcomes and develop into mental disorders.

■ Severe early problems in the emotional attachment between infant and caregiver create increased risk for certain mental disorders, such as borderline personality disorder, as well as impaired peer relations. **Future studies of attachment need to examine in more detail both stability and change in parent-child attachment relationships. In addition, because, as their social network expands, children form attachments to siblings, friends,**

**grandparents, daycare personnel, and teachers, the developmental impact of these understudied aspects of attachment also requires examination.**

■ Confirmed connections between parental depression and disordered parent-child attachment raise the possibility that a mentally disturbed caregiver influences many aspects of the childrearing environment. **Future research should explore the possible contributions of other major life stressors, such as parental divorce and severe medical illness, to emerging attachment security.**

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*In a research study of healthy infants, a baby demonstrates her ability to anticipate future events on the basis of remembered sequences of images.*
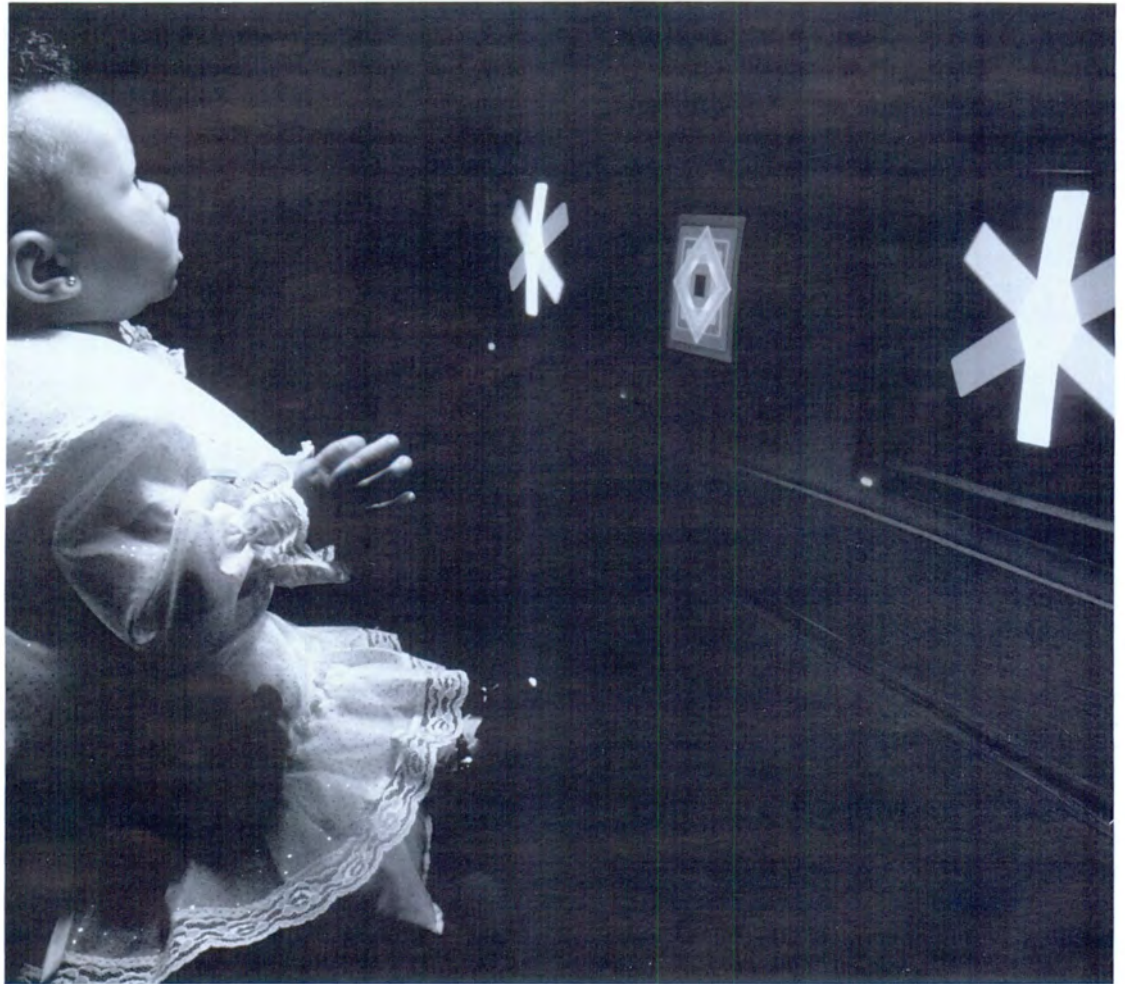


Photo by Joe McNally/Sygma

CHAPTER 3

# PERCEPTION, ATTENTION, LEARNING, AND MEMORY

Behaving intelligently—that is, responding flexibly and appropriately to changes in the environment—depends on acquiring and using knowledge about the world. Cognitive psychologists study how we perceive our environment and attend selectively to some aspects, how we learn, and how we remember the past and think about the future. They are also concerned with how we reason and solve problems, form judgments, and make decisions and how we use language to represent our experiences and communicate our thoughts to others. These cognitive processes, interacting with other aspects of mental life, such as emotion and motivation, are central to what it means to be human. Knowing how these processes function normally helps us understand the many cognitive disorders seen in mental illnesses.

## Sensation and Perception

As adaptive creatures, we humans need to know what is happening in the world around us. Sensation tells us there are objects in the world outside ourselves; perception tells us what and where they are and what they are doing. Together, our sensations and perceptions link our brains to the world and allow us to form mental representations of reality.

We know the world through many senses, including seeing, hearing, touching, smell-ing, and tasting. With more than 50 percent of our cerebral cortex devoted to visual functions and much of the remainder devoted to audition (including speech), seeing and hearing are by far the most studied.

The visual sense is amazing because we can create vivid, detailed representations of the world from rather fuzzy patches of light momentarily projected through the lens of the eye onto the retina. From this highly impoverished two-dimensional array of light and dark, we construct a complex three-dimensional mental model of the world around us. This model identifies people and objects of specified shapes, sizes, and colors, located at specific places or moving across our field of view. The processes underlying this everyday miracle are still somewhat mysterious, but behavioral scientists specializing in sensation and perception are discovering the steps that transform retinal nerve firings into the internal cinema of daily life.

In tracing those steps, researchers have found that very small aspects of the retinal array provide a basis for leaping to gigantic conclusions about what is "out there." One fuzzy edge of darkness on the retina may come from a building a certain distance away, while another may come from a man leaning out the building's window. Our brain combines that information from the retinal array with knowledge, beliefs, and expectations to make reasonably informed guesses about

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what is present in the scene. Our inferences about the location, movement, size, color, and texture of objects also involve a huge amount of guesswork. In our everyday lives, we hardly know anything for sure, but because the world is a fairly regular place, we usually surmise correctly. The fact that perception relies so much on our knowledge of the world implies that it cannot be studied and understood in isolation; scientists must link perception with other cognitive processes, such as learning, memory, judgment, and problem solving.

The study of perception is one of the most advanced areas of psychology. Many perceptual processes, especially those involving vision and audition, are well understood and provide a vital bridge between neuroscience and behavioral science. But much more must be learned. One major mystery is how we identify the shapes of things—the configuration of contours and edges that populate our visual world with poodles, people, potholes, and Picassos. Another is how we move from identifying the shapes of objects to identifying the objects themselves. A third is how perception is influenced by a person's experiences, motives, expectations, and goals.

## Recognizing Patterns

Every movement we make involves the ability to recognize various kinds of patterns that we see, hear, touch, taste, and smell. Pattern recognition is crucial to identifying objects and landmarks, moving through a building or a city, reading books, appreciating art, listening to speech and music, even savoring a good meal. Indeed, research has revealed that the essence of expertise in a specialty area lies less in overall reasoning ability than in the ability to recognize large numbers of different patterns as meaningful and significant for action.

In any given domain, experts differ from novices largely in terms of how many pat-terns they can recognize quickly and respond to appropriately. For example, a chess grandmaster's skill depends in large part on the ability to recognize about 50,000 different chessboard patterns of attack and defense. Experts in activities as diverse as detecting cancer cells under a microscope, interpreting speech, and identifying schizophrenic delusions all share mastery in recognizing patterns that recur in their domains.

## Recognizing Shapes

Research in perception has focused on such fundamental problems as how we separate a figure from its background and how we organize different figures into coherent patterns. For example, behavioral scientists have found that we tend to see small figures against larger backgrounds, rather than the reverse, even though both perceptions are logically possible.

Researchers have also discovered how perceptions remain constant despite changing patterns of stimulation. A person approaching down a hallway is not perceived as growing larger, even though on the retina, that person's image is expanding dramatically. This occurs, in part, because the observer knows that people stay the same size over short time intervals—a contribution of memory to perception. The mind also uses distance cues to compensate and correct for apparent changes in size.

This finding tells us something important about how visual perception operates. The cues to distance, size, and motion are not simple physical attributes but rather ratios of these attributes, such as the retinal height of the approaching man relative to the height of a nearby telephone pole. To maintain perceptual constancy, the visual system keeps track of a large number of different ratios—a tribute to the computational power of the human mind.

One of the most difficult research problems

is understanding how shape is perceived and recognized. Shape is the most important attribute humans use in identifying objects; for this reason, simple line drawings often suffice to communicate the essential aspects of objects and scenes. Because written words are composed of letter shapes, each with a unique configuration of lines and angles, even reading can be regarded as a shape-processing task.

Recent experimental work is beginning to explain how we see shapes and how we organize the mental representations that help us recognize familiar objects rapidly. According to one theory, object recognition involves a three-stage process. First, we segment an object into parts. This "parsing" tends to take place at points of concavity where the outline of the object curves inward. Second, we identify these parts as arrangements of simple three-dimensional shapes: cylinders, cones, blocks, and wedges. These primitive shapes or "geons" (Fig. 1) can be distinguished readily from one another regardless of the viewing angle. Images of even highly complex natural objects can be built up from a remarkably small set of geons; in fact, only 36 geons are needed to distinguish among all objects. In the third stage, according to the theory, we recognize familiar objects by virtue of their unique arrangement of geons.

Consistent with the theory, experiments on object recognition show, for example, that when asked to view something new, our eye movements tend to focus on points of concavity. Moreover, we can identify objects even when much visual information is missing—so long as critical points of concavity are still represented. From these points people can infer the component geons, and from knowledge of the geon arrangement can infer what the objects are. When the concavities signaling geons are masked, objects are unidentifiable from their edges and vertices alone.
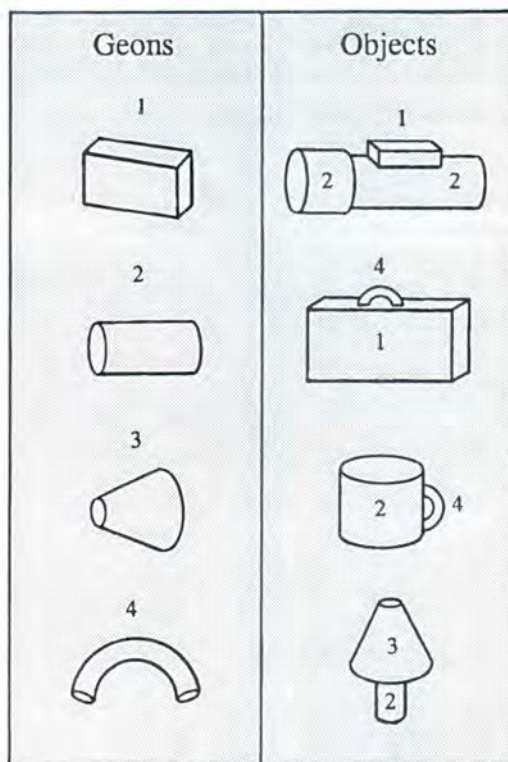


*Figure 1. Examples of geons and of decomposition of common objects into geons. Adapted with permission from Biederman, I. Matching image edges to object memory. Proceedings of the IEEE First International Conference on Computer Vision, 1987, pp. 384-392. Copyright 1987 IEEE.*

## Perceiving Words in Reading

Reading written language presents its own shape-recognition challenges. Words are composed of letters, which in turn are composed of elementary features: lines, curves, and angles. From these features, how do we arrive at words? In one traditional view, the visual system first analyzes words into these elementary features, then recognizes certain combinations of features as meaningful letters, and then combinations of letters as meaningful words. Recent research has revealed, however, that reading is probably accomplished in a quite different way.

Consider, for example, a simple experimental task in which a subject must decide whether the last of a string of letters flashed quickly on a screen is a particular one, such

*Figure 2. A model of interactive activation for word recognition. Nodes represent particular features, letters, or words. Each n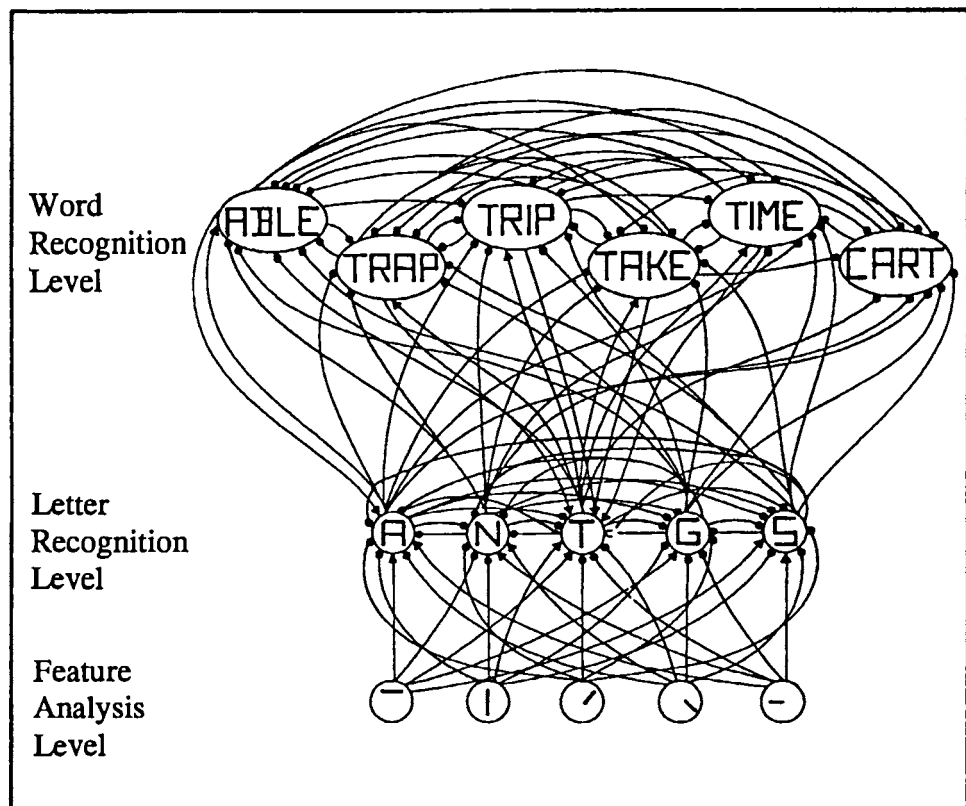ode can be activated to various levels. Activation spreads along the paths headed by arrows; inhibition spreads along those headed by dots. The organization of paths leads to convergence of activation upon a single word, which underlies recognition of the word. Reprinted with permission from Rumelhart, D.E., and McClelland, J.L. An interactive activation model of context effects in letter perception. Part 2. The contextual enhancement effect and some tests and extensions of the model.* Psychological Review *89:60-94, 1982. Copyright 1982 American Psychological Association.*

as a "K." It turns out that subjects are faster when the string spells out a meaningful word such as WORK than when it makes up a word-like sequence such as SORK or a random-letter string such as CGHK. People process letters more effectively in the context of words than of nonwords. This is known as the "word superiority effect." If the traditional view were correct, letter perception would not be affected by whether the string was a word.

Many scientists now view visual perception in terms of information processing based on interactive activation (see Fig. 2). Researchers assume that there is feedback between levels of processing. For example, if a single vertical line is found at the lowest (feature-analysis) level, this information is sent to the next (letter-recognition) level, where it activates representations of letters (such as T and N) that contain such a line. That information is then sent back to the feature-analysis level, prompting it to be especially sensitive to other features associated with the candidate letters, such as right angles (for T) or acute angles (for N).

A similar process happens between the letter-recognition and word-recognition levels. Activating the representation of a particular letter, such as a K, will also activate representations of words containing this letter. This activation, in turn, will be passed back

to the letter-recognition level, resulting in greater sensitivity to other letters occurring in those words. Activation of these candidate letters, in turn, feeds back to the feature-analyzer level. Because both inhibition and activation occur in this system, features not contained in candidate letters, and letters not contained in candidate words, are suppressed.

When we combine words into sentences and sentences into paragraphs, a similar process takes place. Information at higher levels (e.g., knowledge of what a paragraph is about) aids the processing of information at lower levels (e.g., the meaning of a sentence). An interactive process like this seems to occur in other perceptual domains as well. These computations take place very rapidly and unconsciously. Deceptively simple experiments, such as those that revealed the word-superiority effect, indicate that some kind of interactive process occurs. This perspective on perception has been built into computer simulations of perceptual processing that use parallel rather than serial (one step at a time) processing and that permit both top-down and bottom-up flow of information. The new simulations perform well in perceiving words and speech in a manner resembling readers and listeners.

### "Where" and "What" Modules of the Visual System

Within the past decade, researchers have discovered that the large proportion of the brain's cortex devoted to vision is organized into separate areas, each with a different function. In many cases, these cortical areas preserve what is known as a "retinotopic mapping." That is, when adjacent areas of the retina are stimulated, adjacent areas in a corresponding region of the cortex are activated as well. Over 30 distinct brain areas have been identified, underlying such functions as recognizing shapes, colors, motion, and even facial expression.

Research on perceptual deficits resulting from brain injury has revealed a major distinction between "what" (object identification) and "where" (location) functions. For example, people with lesions in the posterior parietal region of the cortex can recognize an object as a cup but may find it virtually impossible to use information about its location and orientation to shape their hand properly as they reach for its handle.

Evidence indicates specialized functions for identifying faces. Prosopagnosia is a disorder due to brain injury in which the patient loses the ability to recognize human faces but can still recognize other sorts of objects and can make fine visual distinctions, such as distinguishing among very similar eyeglass frames. In fact, there are at least three separate brain systems for processing faces: one processes facial identity (whose face is it?), one processes face familiarity (have I seen it recently?), and one processes facial expression (is it expressing happiness, anger, sadness?).

## Attention

Not everything that stimulates our sensory receptors is transformed into a mental representation. Rather, we selectively attend to some objects and events and ignore others. If we could not select, we would be automatons reduced to responding to whatever stimulus happened to be the strongest at any moment. Our behavior would be influenced solely by whatever thought, memory, or impulse was passing through our minds, and we would have no goal-directed control over our actions. Attention, then, is an important cognitive key to planned, adaptive behavior.

Failures of attention play a major role in several severe mental disorders. Children with attention deficit/hyperactivity disorder are extremely distractible, presumably

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because they cannot ignore many external stimuli. Patients with obsessive-compulsive disorder are unable to inhibit unwanted thoughts and impulses. People with schizophrenia describe a loss of mental control over both internal and external events. Similarly, individuals with depression and manic-depressive illness often report difficulties in focusing attention and in suppressing unwanted thoughts.

Psychologists have developed many ways to assess normal and abnormal attention. For example, in the "dichotic listening" task, subjects wearing earphones are asked to repeat a message sent to one ear while ignoring a different message simultaneously sent to the other ear. This task is relatively difficult when presented in similar (e.g., both male or both female) voices, but relatively easy when the two messages are presented in different (e.g., female and male) voices. In the latter case, we are greatly helped by the difference in voice quality.

In another attentional task, subjects are asked to name the ink colors in which words are printed—usually done easily. But if the words are color names, such as red, printed in ink of a different color, such as blue, considerable interference and disruption can occur as people try to attend only to the ink color and suppress naming the color word.

Researchers have also examined the demands on attention when subjects search for certain "targets" in a visual display. They have found several types of situations in which focused attention is required: when separate objects that share potentially interchangeable features must be identified and located, when the target object is defined only by its lack of a feature found in all the irrelevant objects, or when feature differences are small and difficult to discriminate. Targets are easy to find if they have unique features, such as color, motion, or size. Searching for a target line among others that

are slightly longer or brighter requires focusing attention on each item in turn, but a circle can easily be found in a display of lines.

Laboratory studies are examining, as well, people's ability to divide attention. In one study of distraction by internal thoughts, subjects were asked to perform mental arithmetic while watching for a particular letter to appear in a rapid sequence of other letters. As the arithmetic problems became more difficult and required more attention, the pupils of subjects' eyes enlarged (an indication of attention), and they were more likely to miss target letters.

Interestingly, people with some mental disorders, such as schizophrenia, tend to perform especially poorly on attentional tasks. Future research of this type may develop laboratory tasks that will diagnose attentional deficits with the same rigor and accuracy now used in measuring blood pressure. However, that task is likely to be complicated by the finding in both normal subjects and patients that performance on one attentional task is not necessarily correlated with performance on another. Attentional resources seem to be specific to particular sensory modalities. The more two tasks depend on the same modality, the more they are likely to compete.

Thus, we have the paradoxical finding that it is much easier to sightread piano music while repeating back oral sentences (using two different modalities—vision and hearing) than it is to listen simultaneously to two different sentences (using the same modality—hearing). Attentional problems may also arise when attention is divided between two tasks that both use the same modality. For example, skilled typists have difficulty taking dictation over earphones while simultaneously reading a printed passage aloud, but find it easy to repeat an oral message while performing the motor task of typing from a printed text. Future research should clarify

further the attentional mechanisms through which we select and control what we see and hear, learn and remember, think and do.

# Learning

Perception and attention enable us to deal with the present moment. Adaptation also requires learning from experience to improve our behavior in the future. Individual learning experiences are central in shaping us as individuals and generating our separate personalities, desires, likes, dislikes, and skills.

## Learning and Prediction

After considerable investigation, behavioral scientists now have a good grasp of fundamental principles of learning, such as how animals and people learn relations among events in their environment and how they learn the effects of their behavior on that environment. Progress has been particularly striking in the understanding of "classical conditioning," the process through which organisms come to associate simple events with one another. This fundamental form of learning is critical for adaptive behavior. Many organisms, including humans, depend upon relatively innocuous signals to warn them of impending significant events. Survival may well depend on identifying those signals accurately. We now know that organisms behave as if they are sophisticated statistical evaluators of information, selecting for association those stimulus events that predict the presence or absence of other significant events.

The current view of conditioning is based on the intuitively simple idea that organisms learn more effectively from unexpected than expected events. The point is well illustrated by a powerful phenomenon known as "blocking." Consider, for example, a situation in which two signals, a tone and a light, jointly precede some important event for an animal, such as an electric shock. If the animal had previously encountered only the tone as a warning signal for shock, when it appears together with the light as a warning signal, the animal treats the light as redundant and uninformative. As a result, it will fail to associate light with shock and will not react appropriately if subsequently only the light is presented. In other words, the prior association of the tone with shock will block learning of the light-shock association.

Experimental studies of blocking have revealed that animals are very sophisticated in detecting and analyzing environmental cues. They also suggest that animals develop relatively complex internal representations of the world. The implications of this work for humans remain to be explored. By clarifying how certain environmental stimuli and situations elicit or suppress undesirable behavior, such as drug abuse, future studies may lead to new approaches for treatment and prevention.

## Conditioning and Addiction

Some of the complex effects of addictive drugs follow conditioning principles. For example, researchers have shown that the development of one form of drug tolerance (an addict's need to consume increasingly large quantities of a drug to achieve the original effect) occurs in part through classical conditioning. This process is reasonably well worked out for morphine, and there is increasing evidence for the involvement of conditioning in some consequences of abusing alcohol.

Animal studies of these processes have yielded important information about how tolerance develops. A rat that receives morphine injections in one specific environment will develop a strong morphine tolerance in that place but show far less tolerance when

injected in a different environment. In fact, a drug concentration that animals have learned to tolerate in the conditioned environment will kill them (from "overdose") if injected in a novel environment. Parallel studies of human heroin addicts who have accidentally overdosed themselves have revealed that most had taken their usual drug dose, but in an unfamiliar setting.

Conditioned drug response to cues of the customary drug-taking situation explains many observations. Addicts who have been detoxified in a hospital nonetheless retain their drug-related conditioning to the cues of home and neighborhood where they learned about and took drugs with acquaintances. Reentering those places typically triggers withdrawal symptoms, such as restlessness, chills, and intense craving. Those adverse reactions, in turn, motivate relapse to drug taking. Similarly, addicts may have earlier associated drug taking with a way to deal with feelings of anxiety, depression, and helplessness. When those feelings recur after detoxification, they could act as conditioned cues to trigger a return of the person's earlier drug craving. Conditioning also helps explain a startling phenomenon: American soldiers used heroin with extraordinary frequency while in Vietnam but had an exceptionally low rate of addiction (7 percent by one estimate) once they were discharged in the United States and thus removed from the situational cues associated with their drug cravings.

Since drug addiction can be conditioned, behavioral techniques can be used to decondition it. Behavioral scientists have successfully used gradual desensitization procedures with detoxified addicts. Addicts are reexposed to the rituals and the handling of drug paraphernalia (e.g., "cooking" equipment, pipes) and observe videotapes of other addicts cooking up cocaine and talking in drug vernacular. However, since no drug is actually given, the addicts' conditioned craving gradually diminishes with repeated expo-

sures to these cues. The addicts can then return to their homes, neighborhoods, and acquaintances armed with specific ways to cope with the recurring temptations, which have now lost their power to trigger relapses to the drug-taking habit.

## Instrumental Learning

Animal experiments on "instrumental conditioning," another form of learning, also have important implications for human behavior. In instrumental conditioning, the organism learns that certain environmental events, such as receiving rewards or punishments, depend on their own behavior (such as pressing a lever). Just as classical conditioning underlies many of our involuntary emotional responses to objects and events, instrumental conditioning underlies most voluntary behaviors performed for incentives. Through instrumental conditioning, organisms learn to control events; they learn instrumental responses that obtain rewards and avoid punishments.

Behavior analysts have developed sophisticated methods for studying this fundamental type of learning. Procedures for establishing and maintaining instrumental responding in animals have been especially useful for evaluating how psychoactive drugs affect motivation and performance and studying drug-discrimination, drug-substitution, and drug-blocking effects. Similar behavioral methods are used in animals to evaluate effects of brain lesions, hormonal variations, environmental stressors, and other physiological manipulations that might influence an animal's perception, learning, motivation, or performance.

All such behavioral assessment methods were developed from basic research on instrumental conditioning. The methods are not restricted to animal studies, however. Instrumental conditioning forms the basis for a large number of behavior modification techniques with human beings—in the clinic

or hospital, in the schoolroom, in business, and in everyday life.

This type of learning also forms the basis for biofeedback training procedures by which people learn to control physiological activities (heart rate, blood pressure, muscle tension) that are not normally under voluntary control. For example, patients with muscle-tension headaches may be trained to relax neck and forehead muscles by showing them amplified electrical signals from those tense muscles. They are then rewarded (or reward themselves verbally) whenever their thoughts or postural adjustments reduce their muscle tension.

## Learning and Control

In many pathological conditions, people have difficulty foregoing immediate, small rewards to obtain delayed, but more substantial, rewards. Some impulsive and sociopathic individuals have not learned how to delay pleasures. Other examples of poor impulse control include addictive behaviors, such as substance abuse. In these instances, immediate pleasures predominate over greater, but more delayed, positive consequences, such as good health. Recent research in nonhuman animals is clarifying when such short-sighted choices will be made and how to overcome them.

The psychological consequences of having control over environmental events are also becoming much better understood. We know now that aversive events that can be predicted or controlled have fewer bad effects than those that are unpredictable, uncontrollable, or both. For example, there is ample evidence that, when allowed to choose, both animals and humans prefer to know when traumatic stimuli will occur and find exposure to such conditions less stressful than experiencing traumatic stimuli that occur without warning. Even more consistent and dramatic are the effects of controllability over traumatic events.

When an animal is placed in a situation in which it receives unpredictable, uncontrollable shocks, it appears to learn that nothing it can do will improve its stressful circumstances. When subsequently in a situation in which the animal can do something to escape from or avoid the shock, its learning is severely retarded; it acts as if it can do nothing about the shock—a phenomenon known as "learned helplessness."

Learned helplessness also serves as a laboratory model for certain forms of depression, anxiety disorder, and posttraumatic stress disorder. Although these disorders are clearly more complex than the animal model, many such individuals complain of feeling helpless and hopeless, and they often experience negative events as uncontrollable.

Animal research shows that the social and biological effects of learned helplessness can be profound. Because animals exposed to uncontrollable shocks become less aggressive and competitive in a variety of situations, they lose rank in their social group's dominance hierarchy. Loss of appetite or weight is also common, as is loss of the ability to feel pleasure. Physiologically, exposure to uncontrollable shocks affects levels of the stress hormone cortisol and several neurotransmitters and increases susceptibility to ulcers, hypertension, and certain kinds of cancer. Further, prolonged exposure increases pain tolerance by increasing the secretion of natural opiates.

Earlier studies of learned helplessness used shock as the uncontrollable aversive event. In recent extensions of this work with primates, researchers have used social defeat (in competition for mates or territory) as the aversive event and found similar effects. Interestingly, the effects of learned helplessness are more strongly related to how long

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the losing animal spends in submissive postures (indicating that it has given up) than to how many bites it receives from a competitor. In addition, the adverse effects of social defeat are strongest in animals who were formerly the most dominant.

Such findings are important in showing that learned helplessness is not simply a response to major physical stressors such as electric shock. Moreover, the finding that dominant animals are most adversely affected by helplessness experiences raises important questions and suggests that losing a position of social control may be even more stressful than never having had it. This issue is an important topic for future research.

## Modulating and Preserving Behavior

New behaviors are constantly being learned in response to new situations. But learning new behaviors does not necessarily eradicate old behaviors, even when deliberate attempts are made to erase the old. The details of new situations determine which particular behavior—old or new—will be evoked. Experiments have shown that people's behavior is exquisitely sensitive to such situational cues, which affect many behaviors such as eating, smoking, or experiencing fear.

These findings have important applications in treating various forms of psychopathology and in correcting maladaptive behavior. People learn to use certain stimuli to help them maintain desired behaviors or to suppress unwanted behaviors in situations that would normally elicit them. For example, patients with phobias can be taught to use the self-guidance talk they learned in therapy to help them cope with fear-evoking situations outside the clinic. Thus, progress is being made in meeting one of the major challenges for therapy: assuring that desired changes are maintained outside the treatment context.

## Social Learning of Fears and Phobias

Many—but by no means all—people who directly experience traumatic events develop fears and phobias. Other people develop such fears without any direct traumatic experiences. What accounts for these differences? Genetic and temperamental factors clearly play some role, but so does learning. For example, studies have shown that primates can learn strong and persistent fears to a given stimulus simply by watching other animals reacting fearfully to it.

Researchers have also discovered that events before, during, and after a traumatic event all contribute to its impact on a given individual. For example, prior exposure to a fear signal (such as a buzzer that will later be a warning of shock) substantially reduces later fear. Moreover, simple preexposure to an individual behaving nonfearfully toward a stimulus retards fear learning. Such findings have important clinical implications. For example, a child who sees a parent or peer behaving nonfearfully in a potentially fear-producing situation may be "immunized" against later direct or vicarious fear conditioning.

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# Memory

Every aspect of daily behavior—even ones as automatic as knowing who we are and where we live—is guided by memories of past experiences. Research scientists have distinguished three phases of memory. First, registering or encoding an event into a memory trace; next, storing and retaining it over a period of time; and finally, retrieving and using it to guide actions. Memory for a particular episode may fail due to errors in any of these three phases. Research is also uncovering many types of memory, each with distinctive characteristics and functions.

To study memory in humans, researchers have devised simple laboratory tasks that permit memory reports to be compared with what actually happened. Subjects may be asked to study a list of words or view a set of pictures or novel shapes; in some cases, they may be presented with more complex material, such as a written narrative, a staged episode, or a film clip. Although such situations seem far removed from everyday remembering, this research has yielded surprising insights into how memory works.

## Reconstructive Memory

One important discovery is that remembering is not just a matter of reproducing a copy of what happened in the past. In important respects, people actively reconstruct representations of events based on fragmentary information stored in memory as well as their inferences about what probably occurred. For this reason, human memory is often not completely reliable. People frequently confuse what happened at one time with what happened at another, or they mix together parts of several memories. When their memories are vague, they fill in the gaps with what they believe to be probably true, often without awareness of their guesswork. The tendency to edit and embellish what we recall seems to be a natural outcome of the way human memory works.

Considerable research shows that knowledge acquired after an event often becomes incorporated into memory for that event. In a typical study, subjects first witness a complex event, such as a simulated crime or an automobile accident. Then half of the participants receive new and misleading information about the event, often subtly disguised in questions they are asked about it. The other participants receive no such misinformation. When the subjects recall the original event, those given the misleading information reveal distorted memories. This effect has been confirmed in many studies. People have

recalled nonexistent broken glass and tape recorders, a clean-shaven man as having a moustache, straight hair as curly, and even a large barn in a rural scene that had no buildings at all.

Going beyond demonstration studies, more than a decade of research has revealed the conditions when people are particularly susceptible to postevent misinformation. Memories are especially prone to modification when the passage of time allows the original memory to fade and when the misinformation is subtle and comes from a credible source.

Memory reconstruction has also been studied in the context of eyewitness accounts. Interestingly, research shows little relationship between a witness's degree of certainty and the accuracy of the memory, illustrating that confidence levels, like the contents of memory, are malleable. Witnesses become more certain of their recall if they receive corroborating information from someone viewed as having reliable information. These results underscore the point that memory is not pure. What we remember is affected by what we believe about the person or event being remembered.

## Emotion and Memory

Recent research has focused on how memories are shaped by a person's emotional state. Interest in this topic started with Freud's concept of repression, or the motivated forgetting of threatening material. Although interest in documenting repression-like effects continues, recent research has discovered several further phenomena relating memory to emotion and mood.

"Mood-congruent memory" occurs when one's current mood aids the processing of material that has a similar emotional valence. Thus, a depressed mood heightens memory for unpleasant events, while elation height-

ens memory for pleasant events. Depression affects both the storage and retrieval of memories. Depressed people pay more attention to material that agrees with their current mood, causing it to be better learned; at retrieval, sad mood apparently provides internal cues that help call forth similar emotional memories. Mood congruency is especially powerful when remembering autobiographical events. Subjects recall personal memories more readily when the mood of those events matches their current mood state.

Such studies are important in indicating how cognition and emotion interact. Our thoughts can affect our emotional states, just as our emotions can affect how we perceive, think, and remember. Understanding these effects is especially important when depression or anxiety is treated by cognitive-behavioral therapy, which often requires clients to acknowledge, remember, and rehearse previous times when they were happy and successful or courageous and fearless.

## Forms of Memory

Traditional philosophers regarded memory as a single mental faculty, governed by simple rules and processes. However, recent research has shown that, far from being unitary, memory can be analyzed into a number of forms or systems, each with distinct characteristics and processes.

### Working Memory

"Working memory" refers to the processes involved in temporary, short-term storage and use of fleeting information, such as holding telephone numbers in memory while dialing. Behavioral researchers have made considerable progress in recent years in understanding the mechanisms involved in working memory and in clarifying its role in everyday cognitive performance. For example, working memory has a speech-based

component (strongly implicated in verbal intelligence and understanding language) and a perceptual-imagery component (implicated in spatial ability and reasoning with mental images).

Evidence for these components comes from several sources, including studies of brain-damaged patients with specific deficits in working memory. For example, stroke patients with lesions in the left temporoparietal areas often have selective impairments of the speech-based component, whereas patients with right-hemisphere damage often exhibit selective impairments of the imagery component.

### Implicit Memory

Historically, most research on memory has focused on people's conscious, intentional recollection of previous experiences. This "explicit" memory is involved when we remember what we had for dinner last night, recollect what we saw at the movies last week, or reminisce about adventures with an old high school friend.

Over the past 10 years, however, research has developed on unconscious or "implicit" memory, in which people's past experiences affect their present perceptions and judgments without their awareness or voluntary control. Much recent evidence indicates that explicit and implicit memory are separate. For example, implicit memory is often left intact even when explicit memory is profoundly impaired by brain injury. Researchers have also explored implicit memory in patients with dissociative disorders such as multiple personality, who have several "ego states," each associated with different autobiographical memories. Surprisingly, implicit memories transfer across the patients' many personalities even if explicit memories do not.

Patients suffering severe amnesia due to

## Measures of Unconscious Memories

In laboratory experiments on implicit memory, subjects might study a list of words containing the item ASSASSIN. Then they would be presented with fragments of studied and unstudied words, such as A—A—IN or T—I—Y. In one test, the subjects are asked to complete the fragment with an item from the previously studied word list, a task that requires conscious recollection. In another test, they are simply asked to fill in the blanks with the first word that comes to mind. In both tests, subjects are more likely to succeed in completing the fragment if it is of a previously studied word. The advantage for previously studied words on the second task reflects the influence of implicit memory, which appears to be independent of conscious recollection.

Many other methods for measuring implicit memory have been investigated. For example, someone exposed to the word HARE in a list may reveal unconscious memory for that word later by being quicker than controls in seeing it in a fuzzy or quick-flashed presentation. The person may also have an advantage in reading the word aloud, reading it when printed upside-down, judging it to be a word (versus nonword), spelling it after hearing the spoken sound (rather than HAIR), and giving it as a free association to the category ANIMALS.

brain damage cannot explicitly recollect the items presented in a list of words, but tests show that their implicit memory is intact. Such findings suggest that implicit and explicit memories are supported by different brain structures, only some of which are damaged in patients with amnesia.

The sparing of implicit memory may provide an initial avenue for therapies designed to recover memory and reintegrate personality. Basic research on implicit memory has already yielded novel approaches to the practical issue of rehabilitating memory in people with amnesia resulting from brain injury or disease. In several studies, conditioning procedures based on implicit memory were used to teach such patients relatively complex skills, such as computer programming, which enabled them to gain employment.

### The Cognitive Unconscious

The study of implicit memory provides a general framework for thinking about how unconscious memories of past events influence current experience, thought, and action. As one example, laboratory experiments have shown that people's preference for abstract art can be increased by exposures to it that they cannot consciously remember. These effects occur even when the artworks are initially presented subliminally. To carry matters one step further, in one study, subliminal presentation of faces led subjects to interact more with the actual people depicted—an unconscious influence on their social behavior.

Unlike explicit memory, which depends critically on paying adequate attention to the information to be learned, implicit memory can be robust even without full attention. People have even shown implicit memory for material presented while they were under anaesthesia! Because implicit memory affects behavior unconsciously, its effects can be difficult to control; people under its influence may not know why they are acting as they do.

Studies of people intentionally trying to forget some event reveal that their intention suppresses their conscious recollection, but it has little impact upon their implicit memory of the event. Such effects can have

important practical consequences. For example, when jurors are instructed to disregard (i.e., forget) specified information, their decisions still reveal the implicit influence of that information.

Other studies show that when people are asked to suppress certain thoughts, those very thoughts later come to mind more often than they would have otherwise. Thus, attempts to suppress unpleasant thoughts and images often backfire. Research is revealing more about the ways in which unconscious memories influence our conscious thoughts and actions and how our conscious strategies can be undermined by unconscious forces. These advances should lead to improved therapies for many mental disorders, including depression and anxiety.

## Research Directions

Important directions for future research on perception, attention, learning, and memory include the following:

■ People with perceptual or motor deficits often develop ways to compensate for them, such as gaining greater ability to use information from other modalities. **Research is needed that specifies the nature of these adaptations and how they arise, including variations with age.** Such research can lead to more successful education and rehabilitation for people with blindness, palsies, and other sensory-motor conditions.

■ A range of disorders, including schizophrenia, obsessive-compulsive disorder, and attention deficit/hyperactivity disorder, involve failures in the control of attention. These failures can occur in the initial focusing of attention, maintenance of attention, or interaction with automatic processes. **Further research on the mechanisms of**

**attention is needed to enhance understanding of the causes, prevention, and treatment of attention-related disorders.**

■ **More research is needed to identify the mechanisms by which unwanted behaviors that result from inappropriate early learning, such as phobias and addictions, can be modulated.** Although animal and human research suggest that such learning cannot ever be erased, the resulting behavior can be brought under the control of new stimuli and contexts. Such knowledge should aid in developing ways to reduce the potentially pathological consequences of early learning experiences.

■ **Future research on learning and decisionmaking is needed to clarify how people acquire self-control and the ability to delay gratification. Such research needs to focus especially upon individual differences in self-control that begin in early childhood.** Techniques based on this research will teach children and adults how to delay and plan and may contribute to more effective strategies for preventing severe behavior problems, long-term social and academic difficulties, and drug addiction.

■ The system for placing information in memory, maintaining it, and retrieving it is a complex one that can fail in a number of ways. Such common disorders as Alzheimer's disease, Korsakoff's syndrome, and the various amnesias all involve memory failures as primary symptoms. **New research to understand the precise causes of memory failures in normal subjects will help to identify the underlying nature of these disorders.**

■ Recent research on memory, especially the implicit/explicit distinction, has potential application to the understanding and treat-

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ment of depression and anxiety. **Further research is especially needed on how negative or threatening information is organized in, and retrieved from, memory.** Depressed or anxious people may differ from others in how such information is handled in memory, a characteristic that may underlie or exacerbate their disorders.

■ Various changes in perception, attention, and memory are associated with aging, both in healthy people and those with Alzheimer's disease and other disorders. **Studies are especially needed that describe aging-related changes in the speed of cognitive processing and in the rate of acquiring automatic cognitive processes.** Such changes can affect, for example, how effectively people scan visually, shift attention, or gain conscious access to perceptual information. This research will

lead to the development of training programs and technological aids that will help older people maintain their independence and psychological well-being.

■ New, highly sophisticated information technologies, such as virtual reality, allow participants to become immersed in "alternative" or "fantasy" worlds. **Research is needed to understand both the positive and negative effects of such participation on children's and adults' perceptual and cognitive skills as well as on how participants conceive of and interact with other people in the real world (e.g., peacefully or aggressively).**

## Further Reading

(See "Further Reading" in chapter 4.)

Photo by A. Rosenfeld

# THOUGHT AND COMMUNICATION

The key to human intelligent behavior lies in the capacity for thinking, reasoning, and problem-solving and in the ability to communicate through language. These abilities are often seriously impaired in people with mental disorders; their language may reveal delusions and scattered, incoherent thoughts as well as "word-salad" and idiosyncratic words. Depressed and anxious individuals often reveal self-defeating thoughts and inappropriate reasoning, such as regarding minor slip-ups as catastrophes and dwelling on the negative aspects of experiences that are generally positive.

Cognitive research seeks to understand how thinking, reasoning, and using language develop and function normally, how they are represented in the brain, and how they can break down in aging, brain injury, and various mental disorders. Aspects of this research inform the work of therapists as they challenge irrational beliefs and dysfunctional reasoning, encourage clients to reevaluate their problems, and aid people in overcoming the aftereffects of brain injury and disease.

## Reasoning, Judgment, and Decisionmaking

Significant progress has been made in recent years in understanding the processes of everyday thinking. Much of this work has examined how people make choices and evaluate their own well-being. One important characteristic of this work is that it reveals the interactions of cognition and emotion, both in the normal state and in conditions of depression and anxiety.

## Some Pitfalls of Normal Reasoning

Traditionally, reasoning has been viewed as a rational, conscious activity that follows the textbook rules of logic. But cognitive researchers are discovering that most reasoning is unconscious, automatic, and rarely open to introspection. Further, instead of following formal logic, reasoning uses various pragmatic rules of thumb that provide quick answers with little thought.

Investigators have discovered a number of systematic errors and fallacies that people commit unwittingly while reasoning. A few of the more common ones follow.

### Representativeness

A common error of judgment is to estimate the likelihood of something by how much it resembles our stereotype of the class. In judging the likelihood that a defendant committed a crime, a jury may rely excessively on his resemblance to their criminal stereotype and may give less weight to other evidence suggesting that he may not have been at the crime scene.

## Availability

People's estimates of an event's likelihood are often based on how salient and readily accessible events of that type are in memory. The subjective availability of an event usually closely tracks its objective frequency. However, serious errors can arise when memorability departs from objective frequencies, as happens when particular events are unusually salient or memorable. Thus, dramatic news stories about terrorist attacks or airplane highjackings cause many people to cancel overseas vacation plans, even though they are extremely unlikely to encounter such disasters.

## Framing

People are influenced by whether a choice is worded or framed in terms of gains or losses. In one study, for example, cancer patients and physicians were asked to choose between surgery and radiation therapy for a hypothetical patient suffering from lung cancer. All received statistics about probable outcomes of the two therapies. Half the respondents saw the statistics formulated in terms of how many people undergoing each treatment would be expected to die in either treatment within 1 or 5 years. The other respondents saw the same statistics, only framed now in terms of how many patients would survive over these time periods.

Although identical facts were presented in the two frames, they were evaluated very differently, and the treatment choices differed accordingly. For example, people judged the difference between 10 percent dying during treatment and no deaths during treatment as larger than the difference between 90 percent and 100 percent survival.

## Hindsight Bias

This phenomenon, which is familiar as "Monday morning quarterbacking," also dis-

torts judgments. Once people hear which of several plausible outcomes occurred, they distort their recollection of their earlier degree of uncertainty and now judge the actual outcome as having been fairly predictable all along. This memory distortion—viewing what has already happened as confirming remembered expectations—often prevents people from correcting faulty ways of thinking and learning from experience.

Hindsight biases are known to have important effects in consumer behavior, sports, stockmarket forecasting, pregnancy tests, political elections, jury decisions, and medical diagnosis. For example, when a surgical or medical procedure has an unfortunate outcome, attorneys will often build a malpractice suit based on hindsight reasoning, alleging that the doctor should have known (as we do now) that this bad treatment outcome was likely, thus supposedly proving that the treatment revealed the doctor's negligence.

## Optimistic Bias

People often take risks because they do not expect that they will have to suffer the consequences. This is as true for car racing and gang fighting as for drug taking and risky sexual behaviors. The overoptimism is usually accompanied by a belief in the person's infallibility and ability to control the relevant factors, such as driving well and selecting safe sex partners.

Optimism is not always bad, however. In fact, considerable evidence suggests positive psychological benefits for people who believe their future will be rosier than they have any right to expect. Such optimism keeps people in a positive mood, motivates them to work toward future goals, fosters creative productive work, and gives them a sense of being in control of their destiny. It helps people cope with life-threatening diseases such as cancer and with stressful life events such as rape or serious mental illness.

An illusion of control also helps people recovering from severe depression. It is important to understand the circumstances in which optimism has these beneficial effects.

## Time Discounting

People prefer to receive gifts sooner rather than later, but will trade some delay for a larger gift. The tradeoffs are inconsistent, however. In one study, $100 received immediately was preferred over $110 at a 1-week delay, whereas $110 at a 5-week delay was preferred over $100 at a 4-week delay. If the option to collect the $100 immediately still existed 4 weeks later, individuals usually took it, thus reversing the more sensible decision made a month earlier.

Interest in time discounting of valued goods stems from recognition of large individual differences in how people trade off time against larger gifts or penalties. This issue is relevant to the topic of children's learning self-control and the inhibition of impulsive, irrational behavior.

## Confirmatory Bias

People's conclusions are often unduly biased by what they want to believe. For example, reasoners are more likely to accept an invalid argument if its conclusion confirms their beliefs than if it conflicts with them. Also, in testing hypotheses, people are biased toward selecting cases likely to confirm their preferred hypothesis.

Even among presumably objective scientists, a strong attachment to their hypotheses may lead them to avoid collecting or recognizing disconfirming evidence. Memory researchers have found that when people are motivated to arrive at particular conclusions, they unwittingly search their memories selectively for episodes and facts that will support their desired conclusion. For example, people who had been persuaded that

extroversion would be a more desirable personality trait for them will later retrieve more extroverted autobiographic memories. Just the opposite types of memories predominate when people have been persuaded that introversion is a desirable trait.

## False Consensus Effect

People generally overestimate how many others agree with their attitudes and beliefs—a judgmental bias known as the "false consensus effect." Thus, the number of Americans who believe in capital punishment seems greater to proponents than to opponents. The consequences of false consensus can be hazardous. For example, among adolescents, smokers believe that more students in their school smoke than do nonsmokers. This misjudgment of prevalence encourages young smokers to become regular smokers.

## Transient Emotions, Judgments, and Well-Being

Several prominent avenues of investigation have examined how thinking and judgment interact with temporary emotional states. The preceding chapter reviewed studies of mood congruence, in which a person's emotional state increases the availability of memories and thoughts congruent with that emotion. Interpersonal relations are also affected by emotional congruence. People generally prefer to be with others who share their mood and probably will not change it. Moreover, when people feel friendly, depressed, or hostile, they unwittingly modulate their behavior to elicit confirming behaviors from others. For example, people who feel hostile often expect and receive hostility from others, and depressed people often expect and elicit rejection. Deeper study of these effects of mood will help us understand the spiraling negative effects of hostility and

depression and their impact within dysfunctional families. In addition, it can provide clues to prevention and treatment.

Emotions also influence people's assessments of their medical or psychiatric symptoms. For example, laboratory experiments demonstrate that, when temporarily sad after watching a sad movie, people report more past illnesses, more chronic symptoms, more discomfort from a minor cold, and poorer current health than do people in a neutral or positive mood state. Such outcomes are significant for medical practice because physicians' diagnoses depend a great deal on patients' appraisals of their symptoms.

Sad people are also pessimistic about their future health. This orientation spawns defeatist and fatalistic attitudes that may interfere with healthful behaviors such as quitting smoking or exercising. Sadness may also reduce patients' compliance with medical treatments.

## Controlling Anxious and Depressing Thoughts

Recent research has demonstrated that many people suffering from anxiety or depression have difficulty controlling their negative thoughts. In some studies, people are asked to "think aloud," saying whatever comes to mind. Before the think-aloud session begins, the experimenter describes a striking emotion-laden event. People often initially think aloud about the event. However, if the event is negative, people with anxiety or depression continue to talk about it longer than do other people. Furthermore, when asked to stop thinking about the negative event, people with anxiety or depression have difficulty doing so.

Other research indicates that when anxious or depressed people succeed in moving away from particular negative thoughts related to their own life situation or self-evaluation, it is often to other negative thoughts. These

thoughts then lead back to the original negative thoughts, and so the anxiety or depression is sustained.

Current research is exploring in greater detail how people control their own thoughts, particularly how this control is affected by emotional states and stress. This work will lead to therapeutic techniques for breaking the cycle of negative thoughts in anxious and depressed people.

## Evaluating Well-Being and Quality of Life

Researchers have begun to study how people assess their current well-being, happiness, or satisfaction and how they evaluate past experiences and future prospects. These judgments have important mental health implications. One simple observation is that people can adjust readily to changes in their life circumstances; even substantial positive (or negative) changes that have large short-term effects lead to readjustments that eventually can reduce their long-term impact.

This finding suggests that in many dimensions of life, people are on a "hedonic treadmill," soon adjusting to the next level they reach. For example, research has shown that most Americans, whatever their circumstances, consider themselves somewhat happy. It has also revealed that lottery winners are far less happy—and paraplegics and people with chronic illnesses are far less unhappy—than most people assume. People apparently adjust their scale of satisfaction so that their circumstances are usually judged to be moderately positive.

A significant but little-studied question is whether people can predict accurately how their evaluation of a given person, object, or situation might change with continued exposure or new circumstances. This question is critical not only in career and mate choices, but also in medical decisions, such as how

well one would adapt to life without vocal cords, with a colostomy, or with a lifetime of side-effects from psychoactive medication. Preliminary work suggests that people can be quite mistaken in predicting their future evaluations. As this research develops, it may well lead to changes in the procedures for obtaining medical informed consent.

Other research on people's ability to evaluate the hedonic quality of past episodes in their lives has produced surprising findings. People's judgment of an episode's pain or pleasure is dominated by a few salient moments, notably the episode's affective peak (or trough) and the emotional intensity associated with its end point. A "peak and end" rule of evaluation implies that people are relatively insensitive to an episode's duration; two episodes with the same peak and end point will be evaluated alike, even if one is much longer than the other.

This "duration neglect" has been confirmed in several studies. For example, patients' retrospective evaluations of a moderately painful medical procedure (colonoscopy) were predicted quite accurately by the pain they had recorded at the worst and at the final moments of the procedure. The procedure ranged from 4 to 69 minutes, but patients' subsequent evaluations were independent of its duration. The doctors who administered the procedure also seemed to be oblivious to duration in their overall evaluations of the patient's experience and in their judgment of whether more analgesic would have been useful.

These results have an interesting implication, which other research has supported. The memory of a painful episode can actually be improved by making the episode longer and programming gradual rather than abrupt relief from discomfort. The findings also suggest that the memory of a painful episode will be less negative if relief is provided in the same setting as the pain. Such work on pain is likely to lead to the design of medical procedures that are less

aversive, thereby leading people to undergo treatment more readily.

# New Approaches to Intelligence

Research on judgment, reasoning, and problem solving has appreciably changed our understanding of the nature of human intelligence. Traditionally, intelligence has been considered to be a measurable attribute of mind, just as height and weight are physical attributes, which people possess to varying degrees. The development of measurements of individual differences in intelligence ("IQ tests") was one of the early achievements of psychometrics. The development and validation of intelligence tests provided a standard for attempts to measure other individual differences in domains such as personality, motivation, and achievement.

Past psychometric research on intelligence proceeded largely independently of theories of learning, memory, and reasoning. Over the past 10 to 15 years, however, theoretical advances in human information processing have greatly revised our understanding of the nature of intelligence itself. For example, we now know that intelligence is closely related to how rapidly people can recognize significant patterns and retrieve information stored in long-term memory. Additionally, there have been several investigations of the relation of intelligence to physiological measures of the brain's processing speed.

## Analogical Reasoning

Another critical component in intelligence is the ability to transfer knowledge from one situation to another based on similarities between them—what is known as "analogical reasoning." Accordingly, researchers have turned to assessing intelligence by examining the cognitive processes underly-

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ing the solving of analogies. Three critical components have been isolated: identifying important attributes of the problem at hand and ignoring irrelevant information, inferring the relationships among the components, and using a description of the new problem to retrieve from memory an earlier problem it resembles, then deciding how well the solution to the old problem applies to the current problem. Such analyses form the basis for new approaches to measuring intelligence by assessing the ability to perform each of these component tasks.

Cognitive strategies play an important role in this new approach to intelligence. Individuals may differ in how much they know, but the most significant differences seem to relate to people's ability to plan how to solve a new problem, to decide about alternative approaches to that solution, and to monitor progress toward the solution. Intelligence involves knowing what we know and how to use it to solve the problems we face. Many people with mental retardation are deficient in their use of such cognitive strategies in problem solving. Even when taught a strategy appropriate to a particular type of problem, they may soon forget it or not transfer it to new problems analogous to the ones practiced earlier.

Although analogical reasoning lies at the heart of general intellectual ability, clearly, other forms of intelligence exist. Case studies of geniuses and savants, as well as close examination of brain-injured patients, have led some investigators to suggest at least seven types of intelligence: linguistic, logical-mathematical, spatial, musical, bodily-kinesthetic, intrapersonal, and interpersonal. For example, people differ widely in their ability to perform a sequence of movements and in their ability to understand the feelings and motives of other people. Whether, as some researchers have hypothesized, each of these abilities is localized in a particular brain structure or structures is a question for

future research. Another question concerns the relationship between the multiple intelligences and more general characteristics of cognition, such as speed of processing. The types of intelligence might vary in the nature and extent to which they are determined by general cognitive characteristics, or they may all be influenced in the same way and to the same degree.

## Infant Intelligence

For many years, researchers have searched for infant behaviors that would predict later levels of intellectual functioning. Because infants and very young children cannot perform conventional intelligence tests, early identification of mental capacities has been difficult. However, recent laboratory research on visual attention and memory in infants has generated several behavioral tests that can fairly reliably predict intellectual abilities in later childhood.

Because visual attention is related to cognition, researchers measure where a baby is looking, at what, and for how long as clues to its thought processes. In one procedure, infants are repeatedly shown an attractive visual stimulus until their interest wanes and they become "habituated" to it. The habituated stimulus is subsequently replaced by a novel stimulus. Both how quickly the infant habituates to the first stimulus and how readily its attention is rearoused by the novel stimulus are positively correlated with scores on picture vocabulary tests given in the preschool or early school years.

Another predictor of childhood intelligence is the infant's ability to remember a prior experience. To assess memory in preverbal infants, one procedure allows infants to learn to move a colorful mobile suspended over their cribs. By kicking their feet to pull a string, they make the mobile move and produce music. Once infants have learned this association, researchers test them a few

weeks later to see if they still remember how to turn on the mobile. Memory for this kind of association is highly specific. For example, the infant will remember how to activate the same mobile presented earlier, but not one that is slightly different from the original. Even so, memory as assessed by this test is significantly related to intelligence measured later in the preschool or early school years.

Research on attention and memory in infants has thus led to the development of reasonably valid measures of infant intelligence. In the United States and elsewhere, such tests are being used to study how children's intellectual development is affected by early exposure to various substances such as alcohol, cocaine, lead, and mercury. Other studies are exploring the effects of nutritional supplements and specialized feeding formulas on rehabilitation of early cognitive functioning. Until recently, mental retardation could not be diagnosed confidently until a child was 4 to 6 years old. Based on research on infant attention and memory, we can now begin to develop assessments for much earlier in life, which permits earlier and potentially more effective intervention.

## The Development of Thinking

Although much research on thinking and reasoning has been performed with adult subjects, a revolution has taken place in our understanding of how thought processes develop from the earliest years of life. Traditionally, our conception of children focused on their quantitative differences from adults. It was assumed that just as children grow physically, they also grow mentally. In essence, a child was construed as a less intelligent version of a grownup. The idea that children become more intelligent as they grow up underlies the notion of mental age and the traditional psychometric concept of IQ.

Over the years, however, our conception of development changed radically. We began to understand that children are different from adults in qualitative as well as quantitative ways. In other words, children have their own ways of thinking, which must be understood on the child's terms, not just in comparison with adults. This view implies that young children simply cannot perform some tasks because they have not yet developed the particular mental abilities those tasks require. This view led to a remarkable series of studies that tested the limits of cognitive capacity in infants and toddlers. It also led to many studies of infants' mental abilities that revealed an unexpected pattern of both early "brilliance" and early "backwardness" from an adult perspective.

One area of unexpected skill is very young infants' ability to imitate, often at several minutes' delay, the gross movements and facial expressions of adults and even other infants. Imitating facial expressions suggests a remarkable cross-modal capacity to store a visual pattern (the adult's expression) and then translate it into facial movements (the child's imitation), which the infant cannot see. Such mimicry in infants appears to be a precursor to the development of emotional communication, empathy, and attachment between infants and caregivers.

Another area of unexpected skill is in elementary counting. For example, in one experiment, infants were shown two identical toys. Then a screen was placed in front of the toys, blocking the child's view. The child's attention was next drawn to a third toy, which the experimenter placed behind the screen. The barrier was removed to reveal either three toys (the correct number) or two toys (the incorrect number). Interestingly, infants gazed longer at the display when it contained an incorrect number of toys than when the number was correct. Apparently, they had "counted" how many toys had been placed behind the screen and were surprised

(and hence looked longer) when the displayed number of toys violated their expectations. The study suggests that even very young children, who lack language skills and have had no instruction in arithmetic, have some rudimentary counting skills.

## Children's Theories of Mind

Studies such as the preceding one suggest that infants possess certain "islands" of rudimentary competence, which become more refined and generalized as the child develops into an adult. However, researchers have found that both qualitative and quantitative changes in thought processes occur over time. One area that changes qualitatively is children's understanding of their mental abilities and how to use them. Adults possess such "metacognitive" skills, or the ability to be aware of and control their own cognitive processes; young children have to develop this ability.

Research examining children's understanding of mind (both their own and other people's) is yielding intriguing new findings that may aid in helping children with the severe mental disorders of schizophrenia and autism. Normal children have the rudiments of a "theory" of mind by age 2 or 3, although important developmental changes continue from ages 3 to 5. Their theory includes notions about what distinguishes people and animals from one another and from inanimate objects. It also includes the idea that people's thoughts and feelings may differ, even when they are reacting to a common event.

Between ages 3 and 4, children have difficulty realizing that other people may believe something that is not true (or that two people may reach different conclusions from the same body of evidence). But by 5, they usually understand the concept of false belief. These more mature components of a theory

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### Learning Complex Skills

Research has shown that students learn skills and school subjects most efficiently when they have their own tutors. These personalized teachers can assess the students' knowledge, infer the sources of their misunderstandings, prevent or shorten frustrating impasses, arrange lessons targeted to overcome specific skill deficits, and provide practice, corrective feedback, and encouragement to consolidate the new learning. It is often impractical for every student to have a private tutor, but researchers have applied learning principles to design computer tutors that offer much of the skill assessment, corrective feedback, and individually designed remedial coursework that human tutors provide. In addition, the computer tutors maintain a history of each student's progress through several courses.

Over the past decade, computer tutors have been developed and field tested in high school and college math courses such as algebra and geometry as well as computer programming. Evaluations show computer tutors can produce significant gains, often exceeding levels of proficiency achieved by conventional instruction, and in much less time. Students find the computer tutors very motivating, and teachers appreciate having extra time away from drills to deal with other student problems.

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of mind are essential for normal social life, communication, and moral judgment.

Unlike normal children or those with several forms of mental retardation, children with autism have difficulty constructing a theory of the mind of others, even well past age 5.

Current research is examining the types of cognitive representations that underlie the ability to construct a theory of mind and that appear to be lacking in autistic children. This work may well lead to methods for preventing and treating autism.

# Language and Communication

Language is a means of communication that is fundamental to the fabric of human relations. Its many benefits include transfering cultural traditions across the generations and sharing personal ideas, feelings, visions, and plans.

Extremely delayed or absent use of language can signal severe disorders of development and of brain and sensory function. Disturbed use of language is also a hallmark of many types of severe mental illness, such as schizophrenia and autism. Both the diagnosis and the treatment of mental disorders often rest on the sensitive interpretation of what patients do—or do not—say.

## Language Structure

At first glance, most languages of the world seem to be strikingly different from one another, but research has revealed remarkable structural similarities among them. Languages differ in only a limited number of ways, and certain principles of patterning recur in languages that are historically and geographically distant. For example, each particular spoken language draws from the same total inventory of 30 to 40 basic sounds. In addition, all languages organize their words into a small number of types (e.g., nouns, verbs, and adjectives). Word types are defined not by their meanings but by their relative placements within sentences. Further, words are organized into phrases and clauses in certain ways across the various languages.

These and other universals have crucial implications for understanding language learning. Because languages vary in only limited ways, human language users, too, probably vary in only limited ways. Apparently, the seemingly universal structural patterns of languages are constrained in ways that match the minds of their users.

One surprising discovery from recent research is that manual sign languages of the deaf, which have developed independently of spoken languages, nonetheless display the same kinds of universal structural patterns found in spoken languages. This occurs even though the basic elements of sign languages are formed by the hands moving through space, rather than by the lips and tongue moving within the mouth. Because the principles of human language patterning apparently transcend motor or perceptual systems, many researchers believe that these principles probably arise from a more fundamental brain system.

## Normal and Abnormal Language Acquisition

Most children acquire their native languages with relative ease, remarkable speed (within about 4 years), and few types of errors. Scientists believe children do this so readily, unlike adults, because they are innately predisposed to notice and acquire those structural patterns used in language. Nonetheless, language learning poses serious problems for a substantial number of children. These include children with congenital hearing loss, developmental language disorders, autism, and various brain abnormalities affecting language and thought. Language development also may be delayed in normal children when their environments provide only limited opportunities for exposure to language.

Studies of normal children reveal striking regularities in the timing and sequence of

stages as they gain fluent control over their native language. For example, children begin to babble in very consistent ways at about 6 months of age, begin to produce highly predictable types of words at about 12 months, and begin to combine word classes in systematic ways at 18 to 24 months. The timing and stages of sign-language acquisition in deaf infants raised by signing parents is remarkably similar to spoken-language acquisition in hearing infants. Using their hands, deaf children, too, "babble," sign out their first words, and try out their first word combinations at about the same ages and in the same ways as do hearing infants who are learning to use analogous speech forms.

Premature infants do not reach these milestones any sooner than full-term infants do, despite their longer postnatal exposure to language. Such results suggest that maturational age, not length of language exposure, is critical, so the stages of language acquisition appear to be timed, at least in part, by development of the nervous system. By enlarging understanding of how language acquisition works, these findings provide a basis for identifying—and possibly ultimately correcting—some maturational abnormalities very early in life.

Among animals raised by humans, trained chimpanzees have acquired a large vocabulary of about 300 symbols, and a parrot trained to speak many words can understand and use them appropriately to indicate the color, number, and quality of objects it views. The various projects studying language use in dolphins, chimpanzees, and parrots were undertaken to learn about the linguistic potential of nonhuman animals. Training techniques developed for these studies have now been applied successfully to improve communication skills in some children with autism or mental retardation. Sign language has opened a communication window with such children, as have computer-based communication systems using

blocks symbolizing words instead of individual letters. Through some of these methods, children can now learn in mainstream educational programs. Studies of this type also help us understand the limits on language learning in all animals. This knowledge, in turn, may help us set realistic goals and design strategies for language retraining in people after traumas or strokes.

## Normal and Abnormal Language Use

Research on variation within normal populations is essential for understanding how normal life experience affects language acquisition and use. Equally important is research that explores differences in language use between normal individuals and those with disorders. Although schizophrenic speech is one focus of such studies, more research is needed to identify language-processing differences related to other abnormal conditions, such as clinical depression, mania, stroke, and various dementing conditions such as Alzheimer's disease and AIDS-related dementia.

Researchers have analyzed the role of specific brain mechanisms in normal language and then examined the consequences of particular dysfunctions across a variety of tasks. Efforts to coordinate such descriptions with various types of neuroanatomical data are beginning to clarify the linkage between specific aspects of language use and particular areas of the brain. This research is also providing an important new scientific basis for diagnosing brain disorders. Detailed models of normal language processing help to explain why patients with certain types of pathologies show specific patterns of impairment or relative sparing. A next step is to discover how much communicative function can be regained by children and adults with language impairment. Models of language functioning provide the foundation for examining how various interventions may

improve these patients' chances of language recovery.

## Neural-Network Modeling and Behavior

In recent years, new theoretical tools for studying fundamental issues in cognitive research have been developed, including "neural network" or "connectionist" models. This type of theoretical research, carried out on computers using data derived from animal and human experiments, addresses the basic questions of how complex networks of elements similar to the brain's nerve cells (neurons) might give rise to behavior. Neural-network modeling techniques began in the 1950s but developed rapidly only in the last decade after several theoretical breakthroughs. This approach has been applied successfully to explain specific aspects of normal and abnormal behavior. It bridges the gap separating studies of the brain from those of behavior and offers a way to link them.

Compared with the daunting complexity of the billions of actual neural circuits in the brain, theoretical neural networks offer researchers relatively simple models for studying behavior. This approach is providing important new insights into how people might recognize patterns and objects such as faces, acquire and reason with global concepts, and produce and comprehend spoken language. It is also illuminating how people acquire normal reading skills and how that process might fail in dyslexia.

In neural-network models, behaviors such as recognizing an object, pronouncing a word, or comprehending a sentence are accomplished by means of networks of neural units that connect sensory inputs to intermediate neurons and thence to motor output units. Units are interconnected so they become activated and activate one another, depending on the strength of the connection between them. Intelligent behavior, like other behav-

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## Symbolic Communication in Animals

Contrary to earlier belief, research now shows that many species, ranging from honeybees to great apes, have some rudimentary symbolic capacity. Scientists long believed that animals signal only to express internal states (such as hunger or fear), while humans also communicate about objects and events outside themselves and beyond the present time and place. Recent studies have shown that many animals can communicate about external objects.

Symbolic communication has been documented in animals in the wild and in those trained by humans. Among wild animals, for example, vervet monkeys, ground squirrels, and several species of birds give alarm calls that differ for ground predators and for aerial predators. Animals hearing a ground-predator alarm scan the ground and climb a tree; those hearing an aerial-predator alarm scan the sky and take cover on the ground. The calls symbolically refer to and distinguish among the real predators, and the animals hide in appropriate places. Many species use distinct calls when they find food sources; the rate of calling is often related to the animal's motivational state or the food's desirability. Thus, the calls are both symbolic and emotional expressions.

## Modeling Reading and Dyslexia

Researchers have devoted considerable attention to how people learn to read, specifically how they recognize, pronounce, and understand printed words. These studies are helping to illuminate not only the normal process of learning to read but the problems that may underlie dyslexia, a condition in which people are unable to acquire a high degree of reading skill despite adequate intelligence and training.

When reading instruction begins, children (as well as adult learners) already possess large spoken-word vocabularies. Their initial task is to learn how these spoken words correspond to written alphabetic symbols. Mastering the correspondence between the written and spoken forms of language is a key step in becoming literate; impairments in this reading skill are often seen among children who have problems learning in school.

Neural-network models provide a powerful approach for understanding both normal reading and reading difficulties. These computer-simulation models start out like naive children knowing nothing about the correspondence between spelling and sound. After exposure to many spelled words, with feedback about their pronunciations, the models gradually learn these correspondences. After sufficient training, a model can correctly pronounce a wide range of written words, even though many English words have irregular spellings (e.g., have/gave, sign/line, yacht/dot).

Experiments with these models have provided clues to the underlying sources of reading impairment. For example, in one type of dyslexia, people err when reading words with irregular spellings but retain knowledge of the more general spelling-sound correspondences. They make other errors as well, but until recently, it was not clear how these other errors were related to their difficulty with irregular spellings. Much of the entire range of errors can be seen to stem from damage to a single part of the neural network. Thus, the model illustrates how one small area of brain damage could cause the exact pattern of behavioral deficits.

ior, arises from activity patterns over large numbers of such interconnected units.

The neural-network model can modify its behavior on the basis of experience. As it learns, the model adjusts the strengths of the associative connections between units, just as learning in the brain presumably involves adjusting the strengths of synaptic connections between neurons. Eventually, the model learns to behave in the same flexible ways as humans do—generalizing its adaptive responses to novel stimuli in appropriate ways.

To study how different types of brain injuries lead to specific types of behavioral impairments and how they can be treated, a network model of normal processing can be artificially damaged (by deleting connections) in ways that degrade its behavior. It can also be given "treatment" intended to restore normal behavior. One research team, for example, developed and then "lesioned" different neural network models of language processing in an attempt to simulate the performance of patients with one type of aphasia. The researchers concluded that this type of aphasia—in which patients have difficulty

interpreting certain kinds of complex sentences—arises from an inability to keep all the parts of a sentence in working memory long enough to construct its full meaning. The researchers could link the severity of the patient's disorder with the degree of difficulty in holding the sentence parts in working memory.

Other neural-network models have simulated the symptoms of memory deficits seen in Korsakoff's disease as well as aspects of the incoherent language of schizophrenia. Such research has the potential for advancing knowledge of how the brain carries out various cognitive functions and how brain function breaks down in mental disorder.

As this theoretical approach is refined and extended, more effective methods for prevention, early detection, and treatment of dyslexia can be developed.

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## Research Directions

Important directions for future research on thought and communication include the following:

■ Some forms of depression and phobias are rooted in distorted patterns of thought. For example, recent research indicates that depressed people tend to categorize experiences in overly simple and rigid ways. This may underlie the maintenance of negative interpretations characteristic of depression. **Further work is needed to understand how thought patterns such as these arise from and interact with normal thought.**

■ **More research is needed on how emotions (both positive and negative), mood, and stress influence reasoning, decisionmaking, and memory, including studies of the development and**

**structure of cognitive biases and strategies.** This research will lead to better understanding of why people make faulty and unhealthy choices, and how the negative thought patterns of depression and anxiety are produced and maintained.

■ Recent research in which subjects think aloud has revealed that people's attempts to suppress or inhibit emotional thoughts are often ineffective. Paradoxically, trying to suppress a disturbing thought can cause it to return often and with particular urgency. This research is especially relevant to understanding the debilitating ruminations of people with depression, anxiety disorders, and obsessive-compulsive disorder. **More research is needed to improve understanding of thought suppression, strategies to aid it, and methods to help in overcoming sustained negative thoughts and feelings.**

■ **Research is required on how reasoning operates in practical situations that require making major decisions, including choices of mate, school, career, and medical treatment.** A better understanding of such everyday cognition will lead to improved counseling and therapy as well as the design of training programs that teach people how to make more successful decisions.

■ Researchers have worked to identify infant behaviors that predict later intellectual functioning. Studies of infant abilities, especially attention and memory, can aid in the early recognition of cognitive deficits. **Validation studies are now needed to refine early cognitive measures.** Advances in measurement will lead to better understanding of the causes of cognitive impairments in early life, when intervention is most likely to be effective.

■ Children and teenagers are exposed to an enormous amount of complex information

through school and the media. **Future research in language and learning is needed to discover principles for presenting information in ways that most effectively foster understanding and thought.** These principles are already being applied in the design of intelligent computer tutors. Applications of these principles can increase the effectiveness of academic teaching as well as health education and promotion campaigns.

■ **Some research suggests that people in different cultural groups vary in the types of information they are most likely to attend to and in their patterns of reasoning.** For example, in categorizing objects, cultural groups can differ (on average) in how much they focus upon the internal structure of objects versus the relations among them. This difference may be rooted in differences in social organization. **Research is needed to describe such variations in greater detail.** This work will lead to more effective and culturally sensitive education for all children as well as to better strategies for minimizing conflicts among cultural groups.

■ Creative thinking—the generation and evaluation of varied options for behavior—is an increasingly prominent topic of research. Enhancement of creativity might lead both normal people and those with mental disorders to cope more successfully with a wide range of life situations. **Further research is needed to understand better the reasoning and decisionmaking processes that underlie creative thinking and its enhancement.** This work will lead to techniques that encourage creative thinking in schools and workplaces and as a component of therapies for depression and other disorders.

■ **New models of how cognition arises from the organization of brain cells are currently being developed.** Such work is particularly useful for the spe-

cific accounts it provides of the cognitive deficits arising from brain damage and those associated with disorders such as schizophrenia. For example, current research indicates that many deficits stem from a weakened capacity to associate various pieces of information, which can be attributed to a single abnormality of brain function. **Future studies should further specify and test new models of cognition based on this line of research.** These studies can lead to methods for preventing and treating cognitive disorders.

■ Recent studies suggest that some disorders of cognition, including disorders of language capacity, have a genetic basis. **Further investigation of the genetic and experiential factors underlying these disorders is needed to discover techniques for prevention and treatment and to shed light on the fundamental principles by which cognition is organized and develops.**

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CHAPTER 5

# SOCIAL INFLUENCE AND SOCIAL COGNITION

Because humans are social animals, understanding how people perceive and respond to the social world is one of the most important tasks of basic behavioral science research. Many of our Nation's most pressing problems—including mental illness, drug abuse, violence, and social and racial conflict—reflect disruptions and distortions of these fundamental social processes.

In recent years, researchers have documented in detail how the processes of social influence and social cognition affect health and social well-being; they are now exploring ways to harness these forces constructively. For example, as we understand more clearly the role of negative perceptions in depression and other mental disorders, more effective types of therapy are being developed to change those perceptions. Scientists are beginning to find answers as well to questions such as why some teenagers can resist the temptations of drug use while others cannot, and why some children can ignore minor irritations while others feel compelled to fight.

Research in this area is also clarifying how racial and gender stereotyping contributes to interpersonal hostility and loss of self-esteem, and how negative stereotyping can be lessened. In addition, research advances are helping to improve the efficacy of public health campaigns, such as efforts to reduce the spread of AIDS. Many of these areas of progress and continuing challenge are sampled in this chapter.

## Social Influence

A long tradition of research on social influence reveals how this process establishes and changes people's attitudes, values, and most important, behavior. Research scientists have uncovered many of the factors that determine when and whether individuals will choose to contribute to a cause, obey the rules of society, persist in a task after initial failure, react aggressively or cooperatively in conflicts, or discriminate against minority-group members.

With so many important issues at stake, it is not surprising that attempts to influence opinions and behavior come from many quarters. The voices of advertisers, media producers, family, friends, neighbors, and coworkers all add to the daily din. In addition, and at times more important, our own socially influenced "inner voices"—of conscience, self-concept, and deep-seated stereotypes—come into play. Behavioral scientists are now learning which factors make even these inner voices rise or fall silent as individuals prepare to act. The significance of social influence for mental and physical health is illustrated by three lines of research: the impact of persuasive messages, self-persuasion, and resisting pressure to change or conform.

## The Impact of Persuasive Messages

Many major public health campaigns, such as the "Just Say NO" or the safer sex messages, rely on one of the most active forms of social influence: persuasion. However, not all people are equally swayed by a given message. The impact of a message depends both on its content and style and on the individual motivations and characteristics of those exposed to it. Experimental studies have revealed, for example, that persuasive efforts that present thoughtful, detailed arguments can be very effective in changing people's attitudes—but only if the audience has the knowledge and motivation to comprehend, scrutinize, and evaluate the message. Since people often ignore or reject even well-constructed arguments that present a message of clear personal benefit, how can we increase their chances of accepting messages that are in their best interest?

Researchers have found that when people are unable or unwilling to evaluate the logic of messages carefully, persuasive appeals should rely on simpler psychological principles, such as capitalizing on the authority of a "trusted expert" or the charisma of a likable and attractive communicator, such as a celebrity, to convey the message.

Such an approach has its limits, however. Attitudes changed through persuasive appeals such as this are more susceptible to counterpersuasion than those based on careful evaluation of the message. Thus, alternative or second-phase attempts at persuasion are needed. One prospect would be to increase people's motivation to process more detailed information. Experimental studies have revealed that when people believe that it is essential to understand detailed material or to have a carefully considered attitude, they are much more willing to work hard to understand challenging and potentially persuasive information.

## Self-Persuasion

Years ago, researchers studying attitudes and attitude change made a surprising discovery: If people can be encouraged to behave in ways that are inconsistent with their attitudes, those conflicting attitudes are likely to change. For example, when experimental subjects role-play in front of an audience by arguing in favor of a given position (such as the health benefits of safer sex), they persuade themselves as a result—and do so more effectively than they persuade their audience. Such changes may occur even when subjects' attitudes initially conflict with the requested behavior, as when people with negative attitudes toward ethnic minorities are induced to argue in favor of increased ethnic diversity at their workplace.

More recent research has identified when (under what conditions) and how (by which mechanisms) these tendencies for attitudes to be consistent with prior behavior can be harnessed for useful ends. For example, attitudes can be changed by offering people relatively small incentives for engaging in potentially self-persuasive behavior. Research also reveals the importance of encouraging individuals to feel free to engage or not in the behavior. Exhorting people to do or believe specific things can make them feel coerced, leading them to rebel by doing or believing exactly the opposite.

Detailed knowledge derived from research on consistency and self-persuasion can have important practical applications in designing programs for health promotion and disease prevention. In one experiment, for example, heavy smokers were asked to role-play people who just learned that they had lung cancer. In the course of the experiment, participants discussed and acknowledged the dangerous consequences of heavy smoking. This intervention proved effective in reducing the role-players' smoking—considerably more so than merely exposing smokers

to the same information on the dangers of smoking.

Other research has revealed that behavior change can occur simply by making people aware that their undesirable behaviors are inconsistent with their attitudes. For example, a group of research participants significantly increased their conservation-related behaviors (e.g., turning off lights, car pooling) after they were made aware that, despite their proconservation attitudes, their actual behavior was wasting precious energy resources. Work such as this also provides a powerful tool for evaluating and enhancing the effects of psychotherapeutic strategies, since these often involve identifying inconsistencies between attitudes and behavior.

## Resisting Pressure to Change or Conform

Group influences and mass appeals often strongly pressure people to conform to certain viewpoints and behave in certain ways. At times, people need to resist attempts at persuasion, such as exploitative commercial appeals or teen peer pressure to engage in various high-risk behaviors. Strategies for successfully resisting persuasive attempts are emerging from behavioral science research. For example, to discourage teenagers from abusing alcohol or other drugs, some experimental programs first expose them to typical arguments in favor of the risky behavior. The teenagers are then taught how to refute such pressures, and they practice these skills in role-playing situations. Interventions such as these have been shown to reduce the frequency of the unwanted behaviors.

Another successful procedure counteracts harmful peer influence with positive peer influence. When looking for guidance in how to behave in a given situation, people are likely to attend to those individuals most similar to themselves. For example, health researchers have found that a school-based antismoking program had lasting effects only when the peer leaders it used as "teachers" were the same age as the target group. Similarly, among children who saw a film depicting a child's positive visit to the dentist, those closest in age to the filmed child were most likely to respond with lowered anxiety toward dental visits.

Researchers have built upon these findings about positive peer influence to produce a successful intervention program to reduce impulsive aggression in low-income teenaged men. The program encourages respected peers, who were recruited from among these young men, to speak out against such aggression.

## Social Cognition

One of the most fascinating puzzles about human behavior is why various people respond differently to a given social encounter, and why a given person's responses to similar events differ at various times. A bad day at work may lead one person to vow to try harder in the future but may lead another into an episode of depression that lasts for weeks; an argument with a spouse may cause minor irritation at one time but escalate into abuse at another.

What determines these differences? During the past 15 years, research exploring "social cognition" has made considerable headway in answering such questions. This research has shown that people consciously and unconsciously process their experiences in accord with preexisting views (or filters) of reality. Because these views are unique to individual social histories, each person interprets reality in a distinct way and responds differently to events. Moreover, a person's reactions to a given event may differ over time, depending

on which views are elicited and become dominant in response to that event.

Thus, understanding a person's behavior requires knowing which specific event(s) may have elicited it and how that person interpreted what happened. To understand someone's psychological distress, one must consider not only the person's social context but also those mental frameworks and interpretations that might provoke and maintain psychological difficulties. Research described below is uncovering key factors that affect people's differing social cognitions.

## Accessibility of Social Beliefs

Researchers have found that when people observe an ambiguous social event, social beliefs that happen to come to mind at that moment will influence how they interpret the event. In laboratory experiments, subtle features of a situation or experience, such as a single word or picture, can be used to "prime" or activate one set of stored social beliefs more than others. Once activated, these beliefs can remain readily available for several minutes for the person to use in interpreting and responding to new social events. In other words, social perception is influenced by which beliefs or interpretive biases have been recently activated and made accessible.

Researchers found, for example, that simply being exposed to the word "hostile" increased the chances that a person would subsequently interpret as hostile someone's ambiguous behavior, which could be viewed as either hostile or assertive. Judging the behavior as hostile, in turn, increased the likelihood that the research subject would dislike the other person. Similar research has shown that priming stimuli can create such effects without people's awareness of their source and that priming can even be effective when the priming stimuli are presented subliminally.

In one study, for example, words related to hostility were presented subliminally to adults in what the subjects believed was a radar-blip detection task. Then they read a brief personality sketch about "Donald," who engaged in ambiguous acts (such as refusing to pay his rent until the landlord paints his apartment and turning down a beggar's request for money). Subjects primed with hostility-related words judged Donald as more hostile than did another group of subjects primed with neutral words. Other researchers replicated this finding with subliminal stimuli related to shyness and to kindness, using another story in which Donald's behavior was ambiguous.

Such findings are important because they indicate that our reactions to social situations can be influenced by factors occurring outside of awareness, thereby escaping our attempts at deliberate, conscious control. These results also suggest one reason why people are more likely to respond violently after viewing violence on TV or in the movies. For some individuals, the mere sight of a picture of a weapon in one setting can increase the accessibility of aggressive thoughts, contributing to aggressive behavior in other settings.

In addition to temporary priming, more longstanding individual differences in sensitivities to specific stimuli affect why and how we judge social events. Research has shown that for some individuals, certain specific social beliefs, such as thoughts about honesty, selfishness, or aggression, are chronically accessible. These beliefs operate quite effortlessly and outside of awareness, constantly influencing how individuals interpret often-ambiguous social behavior. Thus, some individuals may be chronically inclined to see hostile intent in behaviors that others might view as neutral or benign.

The principle of accessibility also helps us understand why the dysfunctional behaviors

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of depressed and anxious individuals are so difficult to change. For example, researchers have found that negative beliefs, such as "my situation is hopeless," are chronically accessible in depressed individuals. Although this cognitive pattern could be a consequence rather than a cause of initial depression, both the accessibility of thoughts about hopelessness and the passive behaviors those thoughts evoke probably prolong the depressive state and contribute to the spiraling down effect so commonly seen in this disorder.

One challenge for future study is to determine how and why certain beliefs become chronically accessible, and how to substitute adaptive constructs for maladaptive ones. Recent laboratory research provides an important clue to the sources of chronic accessibility; it shows that the more often a particular kind of social knowledge is primed by a person's environment, the more likely it is to be used. This finding implies, for example, that children who grow up in homes with high levels of aggression will be more likely than other children to interpret and "see" aggressive intent in ordinary social interactions and to respond in kind.

Such findings may also have significant ramifications for cognitive-behavioral therapies. They suggest that because the more frequently and recently activated attitudes are usually the more accessible ones, the efficacy of certain types of psychotherapy may be enhanced through the rehearsal of appropriately selected attitudinal statements. Research is now needed to determine how effective such interventions are in clinical settings.

## Causal Attribution

A critical remark from a spouse or an insult from a coworker may have several possible causes. Research on causal attributions has examined what leads people to explain a given event in diverse ways. This work has shown that different explanations can have distinctly different consequences.

For example, because aggressive boys expect aggression from their peers, when ambiguous interactions occur (such as being bumped by someone), the boys usually attribute them to hostile intentions rather than to neutral or accidental causes. Such activities may become locked into a cycle of aggressiveness and rejection that is difficult to change. These findings suggest that attempts to lessen aggression might focus on changing biased attributions. Indeed, recent research has shown that aggressive boys who received social-skills training that included changing attributional biases became less prone to judge other people's behavior as aggressive; as a result, they were less likely to act aggressively in social encounters.

Attributional processes are also critical to understanding differences in people's responses to success and failure. Observations in school classrooms reveal that some children are devastated by any failure experience; they become upset and anxious and give up with little effort on subsequent tasks. In other words, they reveal a pattern of helplessness that has been implicated as one factor contributing to depression.

Research has revealed that such children often attribute their failures to a lack of ability rather than to the difficulty of the task or to insufficient effort. Studies using experimental interventions have shown that when such "helpless" children were taught to practice lack-of-effort explanations (e.g., "Maybe I didn't give it my best effort") rather than lack-of-ability explanations, both their responses to failure and their school performance improved.

The importance of attributional analyses has recently been underscored by studies of parenting practices. A line of research has shown, for

example, that gender-stereotypic beliefs lead many parents to make different causal attributions for the behavior of their sons versus their daughters. These attributions, in turn, contribute to girls' frequent feelings of inadequacy in sports and science and to boys' sense of inadequacy in language.

Other research has shown that parents' explanations of why their children misbehave (e.g., Billy was too young to understand that stealing is wrong) affect their emotional reactions to the behavior and their disciplining practices. The significance of such work for mental health is suggested by recent findings that negative attributional biases (e.g., the belief that even a very young child should have known better and needs disciplining) are more pronounced among the parents of aggressive and abused children than among other parents.

In short, attributional biases affect behavior in areas as diverse as social relations, academic achievement, and parenting. Thus, an important direction for future research is to examine factors that lead to such biases as well as ways to reduce those biases that lead to maladaptive behavior.

## Standards of Self-Evaluation

People may have diverse reactions to a given event because their prior experiences lead them to evaluate its outcome in different ways. Through interactions with people who matter, such as parents, teachers, bosses, priests, and lovers, people learn how others evaluate their own behavior. These experiences, in turn, provide the bases for developing individual standards for how one *ought* to behave and for how one would *ideally like* to behave.

When people's actual behaviors and characteristics fall far short of their "ought" and "ideal" standards, many negative reactions may result, including anxiety and depressed mood. Failing to fulfill one's ideals represents a missed opportunity for a positive outcome, and disappointment is likely to follow; if this happens often, dissatisfaction and sadness are likely. By contrast, failing to fulfill one's oughts means violating a norm for behavior. If this happens often, tension or anxiety is likely, much as it would be if one were expecting some kind of punishment for bad behavior.

Distinct patterns of emotional reactions have been found to be related to the nature of these failings. Symptoms of anxiety often occur when people fail to meet their oughts (such as cheating on a class assignment), but depression often occurs when they fail to meet their ideals (such as receiving a poor grade in an important course). Whether a given person suffers from symptoms of depression or anxiety can depend on which type of standard happens to be most active.

These findings have potentially important implications for understanding the origins of mood-related disorders and for developing more effective cognitive-behavioral therapies. For the therapist, knowing what kinds of evaluative standards a client habitually uses can help in predicting that person's areas of difficulty as well as directions for treatment. Extending this line of research into work with clinical populations is an important step for future studies.

## Stereotyping and Prejudice

The issue of stereotyping—applying social beliefs and expectations about groups or categories of people to predict the thoughts, behavior, and feelings of individuals—provides a powerful example of the importance of research on social influence and social cognition. Stereotypes are the result of normal thought patterns that typically aid in efficient processing of our social world.

One of the risks involved in stereotyping is that valuable information about the other person's individual attributes is overlooked, distorted, or even misremembered to conform to stereotypic expectations. Stereotyping effects are particularly problematic when expectations and social knowledge are frankly negative (e.g., the mentally ill are all dangerous) or more subtly pejorative (e.g., women are too nice to be top managers in business).

## The Prevalence of Stereotypes

Despite the often pernicious effects of stereotyping, research has shown that it is widespread and that stereotypes are remarkably resistant to change, even when extensive information directly contradicts them. Current studies are uncovering some cognitive processes that contribute to the prevalence of this phenomenon.

### Social Categorization

People try to organize their world in terms of social categories, such as gender, age, and race, that provide social rules for interpreting and responding to others. They also tend to separate the categories as much as possible, because clear separations make the social rules easier to understand and follow. Several studies have shown, for example, that young children form early generalizations about the nature and abilities of girls versus boys and are very resistant to changing these stereotypes.

### The Salience Effect

People attend to information selectively as they try to interpret social events. Researchers have shown that prominent or distinctive features of a situation will attract or seize people's attention, thus excessively influencing how they interpret and respond to the event. One set of studies has revealed that being a member of a distinctive social group is a source of salience that attracts attention, which, in turn, may produce biased judgments of members of that social category. For example, when many people of various types are behaving negatively, as in a riot, the salience effect can place members of specific minority groups at a disadvantage; they will stand out from the other rioters and will more likely be blamed for the trouble. In general, the salience of being a member of a distinctive social category—such as being the only female or African American in an office—can help to generate or maintain stereotypes.

### Illusory Correlation

When told about hypothetical positive or negative personality traits of members of an ethnic, racial, or occupational group, people will later remember having observed far more stereotype-confirming behaviors in group members than actually occurred. Their stereotype distorts their memory to create an "illusory correlation" between group membership and the frequency of the behaviors. Research has shown that by overestimating the frequency of stereotype-confirming behaviors, illusory correlation helps to maintain stereotypic beliefs. In essence, believing is seeing.

Illusory correlation also contributes to forming stereotypic beliefs by biasing perceptions of the frequency of certain behaviors within certain groups, based on the relative distinctiveness of both the behavior and the group. For example, in one study, researchers observed how well people remembered the positive or negative behaviors of members of two groups, one twice as large as the other. In both groups, positive behavior occurred twice as often as negative behavior. Yet people recalled a disproportionately large amount of negative (and more distinctive) behavior within the smaller (and more distinctive) group. These findings suggest that, in some cases, negative stereotypes about ethnic, religious, or other groups can arise

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simply because people perceive illusory correlations between uncommon behaviors and any group that is in the minority.

## The Persistence of Stereotypes

The preceding examples suggest that subtle everyday practices of social cognition encourage people to perceive others in terms of stereotypes. Studies have shown that the nature and prevalence of stereotypes of social groups in America have remained relatively constant over the years. Several reasons for the persistence of stereotypes are emerging from current research.

Investigators have illuminated a process called "refencing" or segregation. People are regularly confronted with individuals who appear to violate their stereotypes, such as a 90-year-old man playing golf or a woman who has risen to the top of a successful corporation. When individual members of a social category violate expectations, they are "fenced out" of the category and no longer viewed as representative of the group. Thus, the stereotype remains intact.

Research shows that one person's strong and stereotypic expectations can actually elicit the expected behavior from the person who is stereotyped. For example, in one experimental study, teachers' false expectations about students' abilities shaped how friendly and encouraging they were toward the students. This behavior, in turn, produced performance differences among children who were initially equal in capability.

In another experiment, white interviewers were found to be less friendly and personable toward African American applicants than toward white applicants, even though the applicants had been trained to respond identically in the interview. In a followup study with an all-white group of applicants, those who received the less friendly interviewing style (previously used spontaneously with

African American applicants) performed worse in the interview than those who received the more friendly style (previously used spontaneously with white applicants).

## Overcoming Stereotyping

Considerable evidence suggests that the biases and distortions involved in stereotyping typically occur automatically and unconsciously. How, then, can the effects of stereotyping be minimized? Several lines of contemporary research are examining whether the shortcuts in information processing that maintain stereotypes can be altered. For example, one study has shown that when people are held accountable for accurately assessing other people, their judgments will rely more heavily on information about the people's specific attributes than on general social categories.

In other studies, behavioral scientists are exploring the possibility that because people typically use whatever happens to be the most readily accessible social belief for making judgments, increasing the accessibility of preferable or competing social beliefs should decrease the use of stereotypic beliefs. Researchers using this technique have successfully reduced people's reliance on stereotypes in making job-related decisions and have minimized the effects of stereotyping on young women's math performance.

# Social and Personal Identity

People's beliefs and attitudes about the social world help them prepare to respond to that world. Their beliefs and attitudes about themselves have an equally important role. Two kinds of identity are crucial to mental health. "Personal identity" as a unique individual (involving one's sense of continuity, stability, and predictability) contributes to feelings of personal control and self-esteem.

"Social identity" as part of one or more groups provides a sense of belonging and connectedness with others.

Understanding how these identities form and change is essential, because they determine, in part, how people react to specific events. For example, research has shown that people's attempts to maintain a strong social identity as part of a particular group can lead to prejudice and acts of discrimination against members of other groups.

## Coping with Challenges to Identity

Research on various kinds of threats to identity reveals the significance of identity to mental health. Major life events or transitions, such as loss of a job, a divorce, a disabling accident, or a sudden illness, often mean a loss or change of identity and feelings of uncertainty about the present and future. For many adolescents, the transition to junior high school precipitates a decline in feelings of competence and self-esteem. Contributing to this decline may be changes in the salience or meaning of important identities, such as a student's academic competence, popularity, or ethnicity.

Developmental changes also affect identity as young children begin to learn about social categories such as gender and race. Research has shown that between ages 3 and 9, children become aware that gender and race are stable aspects of their identity. They also begin to understand that personal character- istics, such as ability at school and popular- ity, are somewhat permanent. These forma- tive periods appear to be times of special sensitivity during which potentially endur- ing—and possibly negative—conclusions are reached about the qualities and values associated with one's social identities. How- ever, such periods may also offer a window of opportunity for averting the formation of a negative identity associated with a child's

race, gender, religion, or areas of perceived incompetence.

Whatever its basis, the experience of dis- crimination and stigmatization forces many people to devalue their social identities. A recent study of Hispanic students entering an Ivy League university illustrates the negative effects of stigmatization on self-esteem. Those students who, at the beginning of their first year, felt most strongly that their ethnic group was devalued and their Hispanic iden- tity threatened in that setting showed the greatest decreases in self-esteem and in the endorsed importance of their Hispanic iden- tity by the end of that year.

Interestingly, however, some newer analyses of such research have challenged the conclu- sion that identifying with a stigmatized group leads inevitably to low self-esteem. Indeed, many people in stigmatized groups maintain a high level of self-esteem. Several programs of research have indicated that people can be extremely resourceful in responding to threats to their identities. For example, mem- bers of stigmatized and rejected groups often preserve their self-esteem by attributing their rejection to their group membership rather than to their individual characteristics.

People can also protect an overall sense of self-adequacy by selectively emphasizing various domains of their identity. If identity in a particular domain is threatened, other valued aspects of oneself can be affirmed. These processes may explain how some eth- nic minority college students cope with stig- matization. Research has shown that because some minority college students feel they will never be seen as successful students, they reject the identity of a hardworking student and adopt an alternative identity based, for example, on being an athlete or sociable party person. Unfortunately, although such strategies may protect self-esteem in the short run, they may interfere with school

performance and thereby lower self-esteem in the long run.

Another approach to dealing with stigmatization and threats to identity involves more constructive strategies, such as forming self-help groups or trying to change the social environment that contributes to a negative identity. Researchers are examining these more active strategies and the situations that influence people to initiate them. One line of research is examining when protests, boycotts, and other such activist strategies enhance feelings of self-worth among members of stigmatized groups.

## Research Directions

Important directions for future research on social influence and social cognition include the following:

■ The goal of many mental health interventions and preventive health campaigns is to encourage positive attitudes and behavior change. Many of the mechanisms and limitations of the change process have been illuminated by basic research on social persuasion. **Research is now needed to bridge clinical and basic domains by investigating how the principles learned through basic research on persuasion operate within psychotherapeutic interventions and may be used to enhance them.**

■ Persistently evaluating one's own or others' behavior as negative, hostile, or unworthy is a core symptom of depression, anxiety, and conduct disorder. How people make these evaluations has much to do with the personal standards, beliefs, and sensitivities people use in interpreting social situations. **Innovative research is needed to identify the specific cognitive and**

social mechanisms by which maladaptive beliefs come to persistently bias judgments. Research is needed, as well, on the social conditions that promote negative or self-defeating evaluations.

■ Stereotyping, and the negative expectations and behaviors that accompany it, pose a serious threat to the psychological and social well-being of individuals and communities. **Since much of the bias and distortion involved in stereotyping occurs automatically and outside conscious awareness, a systematic program of research is needed to identify psychological and social factors that can deter or override the use of stereotypes. Subsequently, this knowledge needs to be applied and evaluated in real-life situations.**

■ The personal and social identities that people adopt have enormous impact on their sense of competence and self-esteem. Periods of life transition, however, frequently challenge and foster changes in identity, often with unhealthy consequences. **More research is needed to specify aspects of identity that are more or less vulnerable to challenge and change as well as the social, cognitive, and behavioral characteristics that accompany transformations in identity.**

■ The formation of social standards, stereotypes, and identity undoubtedly begins quite early in life and thus may be amenable to intervention during childhood. **More research is needed on the development of these basic social processes. Particularly needed is research that identifies the linkages between phases in cognitive development and exposure to socially evaluative messages from parents and from the broader social and cultural environment.**

■ Depression and other affective disorders are maintained in part by very strong attitudes about oneself and others. **To understand more fully the nature and implications of such attitudes for people's lives, research is needed to investigate how certain attitudes become especially influential.** People typically form their important social attitudes as they interact with family members, friends, teachers, and others. **Future research needs to study the formation of social attitudes in the context of families and communities.**

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*Reconciliation after a fight within a family of rhesus monkeys at the Wisconsin Primate Center.*

Photo by F. deWaal

## CHAPTER 6

# FAMILY PROCESSES AND SOCIAL NETWORKS

I n the winter of 1799, a naked boy was seen running through the forests of southern France. Hunters captured this "wild child" and exhibited him like an animal in a cage until French authorities brought him to Paris to be studied by scientists. The boy, about 11 years old, had apparently lived alone in the wild for at least 6 years. Experts, including Philippe Pinel, the father of psychiatry, examined the boy and concluded that he was an incurable idiot. Jean Itard, a young French physician, disagreed. He believed that the child's wild behavior resulted from being isolated from human contact. Itard named the boy Victor and spent 5 years trying to educate him.

When Victor was captured, he walked and ran more like an animal than a human. He had a highly developed sense of smell but was unable to focus his eyes on anything for more than a few seconds. Victor could hear well, but responded only to those sounds associated with food. He would turn toward the sound of a nut cracking but ignore the sound of human voices. He made no attempt to communicate and seemed to see other humans as little more than suppliers for his wants and needs. After more than 5 years with Itard, Victor learned to read, write, and understand a few simple words, but his social development was almost nonexistent. He lived out a simple life and died at about the age of 40.

Victor was one of nature's experiments, one that laboratory scientists could never ethi-

cally conduct. His life showed that the biological blueprint does not provide all that is essential for normal human development; human contact is needed as well. Denied this contact, Victor was physically, socially, and emotionally stunted. The results of millions of years of biological evolution are built into every newborn infant, but the results of millions of years of cultural evolution have to be acquired through social contact.

This chapter examines research on the most fundamental contexts for social contact—the family and networks of social support. It focuses on the processes and dynamics within these systems of relationships that are vitally important to normal and abnormal mental and emotional development.

## The Family and Mental Health

Families shape the quality of our lives. Emotional and economic links among family members stretch across households and decades, influencing our outlooks on life, motivations, strategies for achievement, and styles for coping with adversity. Family relations are the earliest and most enduring social relationships. As a result, family life experiences deeply affect the competence, resilience, and well-being of each of us.

Most people think of the family's influence as extremely positive. To an important minority, family effects are profoundly negative.

Indeed, families provide the context for some of the most severe violence in our society and for long-term patterns of physical and emotional abuse that can have dire effects on the mental health of adults and children. Among married women, for example, 1 in 10 will be seriously assaulted by her husband at some time during the course of marriage, and an unknown number of husbands will suffer similar abuse by their wives.

Why should family relationships so often give rise to pain and conflict instead of support and harmony? Answering this question requires understanding the factors that lead to effective and ineffective family interactions. Researchers have found it useful to examine closely the specific relationships that make up family life, such as those between parents and children or husbands and wives. They have also examined the structural and cultural differences among families; this diversity, too, has important implications for mental health.

## Caregivers and Children

The nature of the family and interactions within it provide a vital context for studying mental health and disorder. Even in the development of schizophrenia, a mental disorder with known biological underpinnings, the quality of the family environment can have a powerful influence. Recent findings from Finland have shown that the children of parents with schizophrenia are significantly more likely to develop a severe mental disorder themselves when raised in dysfunctional adoptive families than in healthy, supportive adoptive families. Specifically, among the 126 adopted children with family histories of schizophrenia, 8 later developed a severe mental disorder, and all 8 were reared in dysfunctional families. Further research is needed to understand the causes of this association.

Such findings highlight the multiple biolog-

ical and social influences—from genes to social interactions—of family life on mental health. They also demonstrate how basic research on families can help in identifying multiple paths to mental illness, which can then be targeted for treatment and prevention programs.

In many species, responsibility for caring for the young rests with the mother. In some, extensive care is given by others—often adult males, older siblings, or members of other generations. Research with both animals and humans has shown that caregiving behavior provides a rich mixture of stimuli to the offspring that often affects both physical and psychological development. For example, holding and touching infants not only provides the sensory stimulation and protection essential for physical growth and survival, but also conveys the comfort and security necessary for early social and emotional development.

These aspects of caregiving provide the foundation for the most critical and time-intensive aspect of caregiver-child relations: the process of socializing children. Although schools, friends, and the media also are involved in this process, instilling in children the beliefs, values, and suitable behaviors of their society remains a fundamental function of the family. Recent research indicates that how caregivers go about this process contributes to a range of developmental outcomes. At the negative end of the spectrum, these include low self-esteem, academic failure, and conduct disorder.

Researchers have also found that childhood problems that stem in part from poor caregiving practices, such as emotional distress and conduct problems, are strong predictors of mental disorders in adulthood. Findings such as these underscore why understanding fundamental family dynamics is an important basis for developing prevention and intervention programs for mental disorders.

## Pair Bonding and Parenting

Among monogamous species of birds and mammals, both parents often care for their offspring. In birds, males and females take turns incubating eggs and feeding hatchlings. In mammals, although males cannot provide food, they protect infants and may carry them and provide warmth for them. Biparental care requires forming a strong relationship between male and female, whether it is the short-term friendships of baboons or the apparent lifetime pair bonds of some species of birds, primates, and other mammals.

Until recently, little was known about the physiological mechanisms of pair bond formation and maintenance. Now, some research suggests that oxytocin, the hormone involved in lactation, is also instrumental in mother-infant bonding and perhaps in pair bonding as well. Specifically, laboratory studies of a kind of rodent (prairie voles) have shown that when females are infused with oxytocin, they develop a preference for the male that is present at the time.

Chemicals that disrupt the brain's use of oxytocin also disrupt partner preferences formed during cohabitation. Determining how hormones such as oxytocin interact with the social environment to affect pair bond formation and maintenance is important for understanding how physiological factors affect or actually regulate social bonds.

## Effective Versus Ineffective Caregiving

What distinguishes effective from ineffective caregiving? Scientists have identified two fundamental aspects of caregiving that are particularly important for children's adjustment or maladjustment. The first concerns how much warmth, nurturance, and acceptance (versus hostility and rejection) caregivers convey to children. The second concerns how much control, structure, and involvement (versus permissiveness and detachment) caregivers display toward children.

Not surprisingly, extreme coldness, open hostility, or rejection by caregivers often contributes to children's emotional distress, aggression, and delinquency. In contrast, high levels of caregiver warmth are associated with children's elevated self-esteem, compliance with caregiver demands, internalized moral standards, cognitive competence, and social adjustment.

Researchers have found that the behavioral impact of these critical caregiving practices is shaped as well by how accurately children perceive their caregivers' behavior and whether they accept the caregivers' demands. The children's acceptance depends, in turn, on caregiver warmth, although warmth alone is not sufficient for effective child socialization. Caregivers must also be effective managers of child behavior—a skill that is quite compatible with warmth. Giving children developmentally appropriate levels of structure and control helps them attend to and focus on important features of the environment and acquire the skills necessary for self-control and self-management.

Effective management and guidance are distinct from controlling, manipulative, or punitive caregiving. Considerable scientific evidence indicates that high levels of control, especially power assertion (high demands accompanied by frequent physical punishment) can have harmful consequences for children. Thus, researchers have further refined the concept of control to distinguish between two types: authoritative and authoritarian. Authoritative control, which provides structure, sets reasonable standards for

child behavior, and communicates involvement, encourages children to develop age-appropriate independence, cooperation, and social competency. Authoritarian control, which combines rigid and harsh enforcement of rules with poorly reasoned and dictatorially set standards, discourages the development of these positive attributes.

Research has revealed two complementary ways by which excessive and rigid control discourages social competency. First, when control is excessive, children tend to view their prosocial behavior (such as sharing, being kind, working hard in school, not lying or cheating) as a means of avoiding punishment rather than as an expression of their own values. Thus, when the risk of punishment is removed, such children may increase their level of antisocial or maladaptive behavior. By contrast, when caregivers exert just enough control to induce compliance, most children will continue to behave prosocially even when authority figures are absent. Second, converging evidence from laboratory and field research indicates that home and school situations that are excessively controlling rather than supporting autonomy undermine children's persistence, competence, self-regulation, and overall ability to deal effectively with life's problems.

Taken together, these research findings indicate that caregiver warmth and control have important, though not always obvious, consequences for child development. For example, unconditional rewards or the overuse of positive, extrinsic rewards, such as giving money or presents for good grades, may actually undermine a child's intrinsic love of learning. Similarly, using rigidly set standards and harsh punishment may interfere with a child's self-motivated adherence to social values. Caregiver control that conveys both warmth and control by setting well-reasoned standards and showing involvement has been found to promote children's social competence, mental health, and well-being.

## Reciprocity Within Families

Research on caregiving originally was guided by the assumption that socialization was a one-way process: Caregivers shaped and molded children's behavior through rewards and punishments and by "modeling" (setting examples for behavior). During the past few decades, however, studies have shown that caregivers and children influence one another and mutually shape the socialization process. Persistently aggressive and strong-willed children, for example, can eventually wear out their caregivers until the adults gradually become more permissive toward their aggression. Temperamentally difficult children are especially likely to interfere with effective caregiving during times of family stress, such as divorce or unemployment.

Growing recognition of the mutual influence of caregivers and children has led to several important research advances in understanding family behavior. By carefully observing the minute details of caregiver-infant behavior, researchers have documented that even very young infants can participate in sophisticated and synchronized patterns of interaction with their caregivers. Healthy infants as young as 1 month coordinate their social and attentional behaviors with those of the caregiver in ways that encourage appropriate levels of stimulation.

Caregivers, for their part, can display exquisite sensitivity to infant behavior, making finely tuned adjustments in their own physical, verbal, and emotional responses to promote coordinated and sustained interaction. Because this interactive ability has been shown to be essential for children's adaptive development, many ongoing early-intervention programs for distressed caregivers and their infants are now designed to encourage more appropriate and coordinated interaction.

Detailed analyses of how family members influence and affect one another have clari-

fied another family process that is directly relevant to mental health: intrafamily conflict. Earlier studies had shown correlations between high levels of family conflict and increased family disruption, psychological distress, and psychopathology in both parents and children. Now, more intensive study of family conflict has revealed specific interactive styles related to these distressing outcomes.

Specifically, the risk of distress and dissolution is usually low in families in which the adults have low-intensity conflict—exhibiting mild forms of verbal anger but maintaining a sense of mutual respect. Risk is high, however, among families in which adults consistently escalate the hostility and intensity of conflict. Two specific patterns typical of such high-intensity conflict have been identified: when one adult belligerently pursues an increasingly angry and withdrawn partner, and when both partners engage in mutually hostile conflict. In general, families that show high levels of hostility and conflict without counterbalancing warm and supportive behaviors are at high risk for a wide range of developmental and relationship problems.

Research has revealed that children in families with high-intensity conflict are at greater risk than other children for developing "internalizing disorders" (e.g., depression) and "externalizing disorders" (e.g., conduct problems). Identifying the specific behavioral and physiological mechanisms that link family conflict to psychopathology in children is a high priority for future research.

Recent research suggests that the quality of the parent-child relationship may have important consequences for parents and their children throughout their lives. For example, parents gain the greatest psychological benefit from the transition to an empty nest when they have developed and maintain good relations with their children. Extreme hostility and conflict or detachment in parent-child

## Social Competence, Aggression, and Peacemaking

Some people believe that aggression in humans and animals is an innate drive that is difficult or impossible to control and that seeks an outlet in behavior ranging from sports to gang violence. However, researchers who study aggressive behavior are tending to view it from a new perspective—as one of several ways that have evolved to mediate conflicts of interest between individual members of animal and human societies. Alternative modes of conflict resolution are being studied, as are methods of maintaining social relationships despite the undermining effects of antagonism.

This changed emphasis stems in part from the important discovery that some nonhuman primates make specific attempts at reconciliation after aggressive conflict. Peacemaking has been observed in a wide range of primate species in captivity and in the wild. Instead of having a fight and then dispersing or forgetting about it, they tend to reunite, often with affectionate behavior such as kissing, embracing, and in some species, sexual contact. Naturalistic schoolyard studies of children at play also have shown that reconciliation often spontaneously follows conflict.

These studies indicate that primates value their social relationships and try to protect them against the undermining effects of aggression. The finding that aggression is particularly common between individuals with close ties has led to the view that expressions of anger are one way in which the terms of relationships are negotiated.

Studies on nonhuman primates suggest that only a small portion of aggressive behavior has lasting negative consequences; generally, aggression is a well-regulated part of social relationships. Researchers are now examining further the social functions of aggression, the natural mechanisms of control, and the environmental factors that stimulate or reduce it.

*A research assistant views a split-screen video recording of a marital couple's interaction. Detailed quantitative ratings of the behaviors observed provide the data for assessing characteristics of the marital relationship.*
Photo by J. Gottman

relations may reduce intergenerational support when it is most needed—by youth during early adulthood and by parents facing the disabilities of old age.

## Marriage and Intimacy

For married couples, the quality of family life obviously varies with the quality of the marriage, its intimacy, and its happiness. Married people, especially men, have better overall well-being—including lower levels of depression, anxiety, and other forms of psychological distress—than do people who are divorced, separated, single, or widowed. Most evidence indicates that the aspect of marriage most critical for psychological well-being is not the spouse's mere presence but the emotional support that the spouse provides. For the receiving spouse, this support creates the sense of being cared about, loved, esteemed, and valued as a person and of having someone who cares about his or her problems.

The effect of marriage on economic well-being also has important consequences for mental health. Married people generally have higher household incomes than do unmarried people. However, the economic benefit of marriage is greater for women than for men. When couples divorce, household income drops, and for women it often remains low for as long as 5 years. For men, the income drop is less severe, and recovery is more rapid.

### Successful and Unsuccessful Marriage

What makes a marriage[2] succeed or fail? During the past two decades, researchers have begun to identify factors related to success in establishing and maintaining intimacy. Important among these are personal

[2] Although most research on long-term, committed relationships has focused on married couples, these findings may also have relevance for relationships between nonmarried, committed partners.

characteristics that often stem from genetic and family influences, such as excessive emotional reactivity and impulsive or antisocial behaviors.

In addition, research from both clinical and social psychological laboratories has identified a number of important "markers" that distinguish distressed from nondistressed relationships. For example, in distressed marriages, spouses are more likely to express negative feelings and to reciprocate negative (but not positive) behaviors. They also tend to see one another's positive behaviors as almost unintentional and accidental but see negative behaviors as motivated by selfish and destructive intent, that is, as an expression of the other's personality.

Growing knowledge of these factors is allowing clinicians and researchers to identify troubled marital and premarital relationships and target them for preventive intervention. In one line of study, for example, the partners' emotional reactivity is observed in the laboratory as they discuss conflict-laden issues in their relationship. Even in this setting, couples quickly move into intense and sometimes emotional discussion. Heart rate and other indicators of partners' levels of emotional arousal during these discussions can predict the probability of marital survival—in some cases more reliably than the spouses' own reports of marital satisfaction.

A second line of research is concerned with the rules or norms people implicitly follow as they give and receive benefits in relationships. In *communal* relationships (such as between family members or close friends), benefits are usually given on the basis of the other's need, with no expectation of repayment. In *exchange* relationships (such as between a worker and a boss), benefits are given with the expectation of repayment. Violating these implicit rules can create problems in relationships. For example, repayments for favors increase liking among

the parties in exchange relationships but decrease liking in communal ones. People's moods improve after helping others in communal, but not in exchange relationships. These findings suggest that promoting an exchange orientation within an intimate relationship may undermine long-term harmony and satisfaction.

These findings also have clear therapeutic implications. A form of therapy once widely used to treat problem marriages involved training spouses to monitor their behavior and to create specific contingency-reward systems for desired behavior (e.g., "I'll do the dishes if you fold the laundry"). However, reliance on this "tit-for-tat" technique produced short-term improvements but not long-term gains in marital harmony. Research on relationship styles suggests that promoting an exchange orientation within an intimate relationship may be detrimental in the long run.

In intimate adult relationships, as with parent-child relations, successful interaction requires more than love. In fact, effective problem-solving skills, competent communication, and accurate perceptions of a partner's intentions all appear to be necessary. Recent evidence, for example, suggests that marital conflict is less likely to lead to divorce or separation when partners share good problem-solving skills. As yet, however, little is known about the specifics of such skills, such as how and when they come into play in successful relationships and how a partner's positive or negative emotions affect their use. All of these issues are important areas for future study.

Researchers have recently discovered that certain patterns of relating may help to protect partners from mental health problems. For example, economic hardship, an important life stress, is less likely to lead to depressed mood in spouses who have supportive partners than in those with unsuppor-

tive partners. A recent controlled clinical study revealed that both marital distress and depressive symptoms were significantly reduced in partners receiving a form of marital therapy based on this line of research. The therapy encouraged couples to discuss how environmental stress affected their thoughts, feelings, and behavior related to the relationship. Continuing basic research on marriage and intimacy will lead to even more effective mental health treatment and prevention programs of this type.

## Family Structure

As life-long marital bonds become less common in America, more varied family structures are emerging. Many people are members of more than one family and are linked biologically and emotionally to people who do not share their household. An important challenge for family research related to mental health is to describe and understand the effects of the varied paths people take in forming and dissolving unions and emotional ties and in establishing new households.

### Single Parents

Increasing numbers of women now give birth to children while they are neither married to nor living with the fathers of those children, and fewer men now share households with or maintain contact with their children. Half of all children in the United States spend some time as part of a single-parent family before reaching age 18.

Studies based on the National Survey of Children and Youth show that relatively few noncustodial parents maintain a stable and predictable pattern of interaction with their children. In fact, nearly half of all children between ages 11 and 15 who are not living with their fathers report having had no contact with them in the past year. As a result, a growing proportion of children have life-long relationships with their mothers and their mothers' relatives but have relation-

ships of uncertain quality and duration with a series of father-figures. How this change affects the well-being of the fathers and their children needs to be understood, as does the impact of fathers' absence on women's relationships with the children they raise.

Even when men live in the same households with their children, their involvement in domestic tasks, including childrearing, is often limited. Researchers have found that despite the increased involvement of mothers in the work force, fathers have not substantially increased their participation in child care and household tasks. More detailed studies are needed to determine the extent of father involvement across ethnic groups within American society and its implications for the mental health of parents and their children.

Research over the past decade clearly shows that marital dissolution and childrearing outside of marriage often have long-term negative effects on children. Children who grow up with two parents do better in many ways than children who grow up with only one. For example, children from one-parent homes have lower intellectual test scores and are more likely to drop out of school. Girls from such families are more prone to become single mothers in their teens, and boys are more prone to engage in antisocial behavior. These differences are seen in children from many social classes and ethnic groups.

Income appears to be one important factor in accounting for differences in child well-being between single- and two-parent families. Single-parent (usually single-mother) families have less income than two-parent families, often because nonresident parents fail to provide child-support payments. Uncertainty due to wide variations in monthly income is also more common in single-parent families; it, too, appears to affect child well-being. Because systematic evidence about income instability is rela-

tively new and difficult to obtain, future studies need to take account of both income level and income security.

## Stepparents

A new wave of studies of mother-stepfather families has challenged the idea that stepfathers can easily replace and fill the role of biological fathers. Such families frequently encounter unforeseen hazards and experience difficult family interactions. Marriage or remarriage often eases many of the time and money problems besetting single mothers, but it provides less clear benefits to caregiving and child development. When a new spouse is brought into an ongoing parent-child relationship, relations with the stepparent do not generally resemble those between parents and children in nondivorced families; typically, stepparents offer less affection, interaction, supervision, and assistance.

It is not clear whether stepparents are less willing to engage in certain parental activities, children are less willing to accept them, or both. Clearly, however, a crucial task in understanding contemporary family processes is to spell out how children and unrelated adults attempt to form relationships—specifically, how they establish bonds and how the differing histories and uneven patterns of alliance affect families. The answers to such questions have implications for the quality and duration of new adult unions, for children's and adults' well-being, and for patterns of solidarity and help-giving later in life.

## Siblings, Kin, and Community

Many people have brothers and sisters, yet little is known about what role siblings play in a person's risk or resilience for emotional and behavioral difficulties. Recent evidence suggests that being the victim of violence by a sibling during late childhood and adolescence is more likely to contribute to later maladjustment than is violence by a parent,

illustrating the need for research on sibling relationships.

The role of extended-family relatives, such as grandparents, aunts, and uncles, in life-course development also requires further study. What little research there is suggests that these family members may compensate in important ways for dysfunctions in the nuclear family and may provide invaluable assistance during periods of significant life stress.

Research has documented that, beyond the effects of intrafamily dynamics, children from single-parent and reconstituted families may lack vital supports in the community. Single-parent families and stepparent families are much more likely to relocate than are two-parent nondivorced families. When this happens, children often lose their links to friends, teachers, and other adults in the community. Lack of social support and instability of support networks, in turn, may well affect children's sense of personal control and responsibility for their decisions as well as their overall mental well-being.

## Cultural Diversity

As cultural diversity increases in the United States, it becomes particularly important to study how interactions within racial and ethnic minority families affect mental health. Both culture and context can powerfully shape the values, beliefs, and attitudes families convey to children. Indeed, recent studies on childrearing expectations have found that the very definition of appropriate or desirable behavior for children of various ages depends upon one's ethnocultural heritage. For example, among Australian mothers, those coming from an Anglo-Saxon background expected 5-year-old children to perform basic self-care behaviors (e.g., making the bed, putting clothes away), while mothers from a Lebanese background held no such expectations and regarded children of this age as still babies.

The idea that caregiving behavior may vary across cultural groups is a topic of growing scientific attention. Although limited in number, studies comparing the childrearing practices of various cultures typically identify both similarities and differences in approach. For example, when the interaction patterns among members of healthy Japanese American and European American families were compared, all families showed similar levels of responsiveness to family members. However, the Japanese American families were more restrained in expressing their individual thoughts and feelings.

Other research has revealed that authoritative parental control is more strongly associated with achievement among European American adolescents than among Asian American or African American youngsters. Recent analyses have suggested that such differences may occur because of cultural variations in caregivers' goals for their children, which need to be understood more fully.

Findings such as these caution against generalizing the adaptiveness of a given family practice in one culture to other cultures and contexts. Even within a given cultural group, family processes that are appropriate in one context, such as a high-risk urban neighborhood, may be out of place and ill-advised in another, such as a middle-class suburban setting.

Studies of family diversity are likely to reveal that unique family traditions and cultural practices within specific groups provide lessons important for all families attempting to reduce their risk for mental disorders. In some populations, for example, caregiving may be as much a community or extended-family enterprise as it is the province of biological parents. A traditional saying captures the concept: "It takes a village to raise a child." Understanding the strengths of supportive neighborhood networks may have important implications for improving family life in American society as a whole. Likewise, studying how minority families prepare their children for potential encounters with discrimination and prejudice can illuminate the broader challenge of coping with adversity of all kinds.

In sum, understanding the norms, values, and processes that are shared across, as well as unique to, families who differ culturally, contextually, and structurally is a major need for the mental health field. Accurately identifying and describing these similarities and differences and their effects on mental health are primary objectives for future family research.

## Social Support and Mental Health

As individuals develop and move beyond their families of origin, peers and friends become increasingly important to physical and mental health. They become so important, in fact, that the theme of a recent public health campaign in California was "Friends can be good medicine." In recent years, considerable scientific evidence has documented a close link between good relationships and overall well-being, particularly psychological well-being.

Literally hundreds of studies have shown that social support protects people from the negative mental health consequences of stressful life events, such as becoming a parent or caring for someone with a long-term illness. Compared with people lacking adequate social support, those who have it while experiencing such stressors are less likely to develop symptoms of emotional distress, including clinical depression. One study showed, for example, that among women who had recently experienced a stressful negative event such as divorce or job loss, the presence of a close, confiding relationship strongly reduced the likelihood of developing clinical depression.

Research has also shown a link between the availability of social support and how well individuals with schizophrenia function in the community. Such people generally tend to have small social networks. However, there is evidence of increased independence and better adaptive functioning among those who have relatively larger networks, greater frequency of contact, and more interconnections among network members. This is especially true if at least one member of the social network is more socially competent than the person with schizophrenia.

Social support has also been examined as a predictor of the course of mental illness. In about 75 percent of studies with clinically depressed patients, social-support factors increased the initial success of treatment and helped patients maintain their treatment gains. Similarly, studies of people with schizophrenia or alcoholism revealed that higher levels of social support are correlated with fewer relapses, less frequent hospitalizations, and success and maintenance of treatment gains. These findings indicate that providing social support has considerable promise as a technique for preventing or ameliorating mental illnesses.

Recent research has examined when and how social support works. One line of study has been exploring how the structure of people's social networks (such as variations in people's access to social clubs or voluntary organizations and the presence of close relationships) affects mental and physical health. This research indicates that access to such networks aids the flow of information, material assistance, and other resources to individuals. These resources, in turn, shape people's behavior and make it more likely, for example, that they will consult a physician when disturbing symptoms develop.

Another line of research has explored the important distinction between "received support" (the amount or frequency of actual

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### Social Regulation of Physiological Functions and Behavior

A major research challenge is to spell out more clearly the physiological and behavioral consequences of social encounters and events. Research with animals provides a unique opportunity to examine these interactive processes by allowing investigators to control and manipulate selected physiological and social-environmental factors affecting behavior. Studies with rats have shown, for example, that when females are isolated from normal social interactions with other females, they have shorter life spans, more irregular and infertile estrous cycles, and mating behavior that is desynchronized from ovulation.

It is now known that among rats and possibly other species, including humans, the timing of ovulation is regulated by pheromones (airborne chemical signals) received through interactions with other females of their species. Further animal study of the social regulation of endocrine function will provide increasing insight into how the social environment can affect basic physiological functioning, including both reproductive behavior and vulnerability to stress and stress-related illnesses.

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support received) and "perceived support" (the person's perception that support is available if needed). Many findings suggest that perceived support is extremely important in alleviating mental and physical distress, perhaps even more so than the actual level of support received. Researchers now need to consider the implications of these findings. For example, measures of perceived support may reflect characteristics of the person

(e.g., optimism) rather than those of the environment, suggesting that for such individuals, interventions to improve social support should focus more on personal attitudes and orientations than on the availability of supportive contacts.

## The Emotional Costs of Social Support

Notwithstanding its benefits, social support often has emotional costs for those who give and receive it. For example, if repeated attempts to help another person are ineffective, that frustrating experience may lead the support provider to avoid the troubled person. Furthermore, people who give more than they receive may eventually resent being used or having their own needs ignored.

There is considerable evidence that women bear a disproportionate share of the responsibility for providing social support in our culture. Wives consistently report providing more support to their husbands than they receive. Women also feel more personal responsibility for providing support to family and friends than do men. It has even been hypothesized that women's disproportionate concern and caring for others is a major factor in their higher rates of clinical depression compared to men. Providing support to spouse, children, family, and friends may simply overwhelm many women.

Long-term caregiving, such as providing in-home care for family members with Alzheimer's disease or AIDS, has well-documented adverse effects on the physical and mental health of caregivers. People who provide such care are at increased risk for developing clinical depression and stress-related physical illnesses. Research in this area is now focusing on developing ways to provide effective social support for the caregivers, which in turn enhances their ability to maintain in-home care for the patients.

## Social-Support Interventions

Given the importance of social support for mental health, researchers have examined two general strategies to foster it: augmenting or mobilizing support from existing social ties and "grafting" new ties onto a person's social network. Such interventions include establishing mentoring relationships between potential high school dropouts and college students, friendly visitor programs in nursing homes, and support groups for caregivers of frail elderly relatives. Other examples include programs offering prenatal and postnatal family support for teenage mothers, pairing lonely widows and encouraging them to chat regularly by telephone, and aiding the development and maintenance of social networks among community-dwelling people with schizophrenia.

Some of these interventions have had excellent outcomes. For example, the positive results of offering intensive family support for teenage mothers were still evident 10 years after the intervention. Compared with nonparticipating matched controls, participants had smaller family size and greater educational and occupational achievement.

Recent research has also suggested that people who are highly distressed and most in need of social support may be the least likely to receive it because their distress can drive away potential supporters. Thus, an important line of future research is to design and examine the effectiveness of interventions that teach people how to modulate expressions of distress or that teach supporters how to cope with chronic distress in the people they help.

## Research Directions

Important directions for future research on

family processes and social networks include the following:

■ Progress has been made in understanding the dynamics of parent-child relations in early childhood and adolescence. **More research is needed on the health-promoting versus stress-exacerbating aspects of parent-child relations across the lifespan. Critically needed are prospective, longitudinal studies that address how accomplishments or problems during one phase of family life (e.g., premarital, infancy, or early childhood) can affect mental health outcomes for children and adults in later life and across generations.**

■ Family disruption and dissolution continue to be major contributors to mental distress and psychopathology for both children and adults. **Continued research on disruptive family processes, such as high-intensity marital conflict or sibling aggression, is needed to identify the specific paths and mechanisms by which family stresses develop and affect adjustment.**

■ Intimate and emotionally supportive relationships are important mental health resources. **Increased study is needed to identify the skills and processes that foster interpersonal satisfaction and contribute to the receipt of long-term support. Especially needed are studies that examine which types of support (e.g., emotional, tangible assistance, informational) offer the greatest mental health benefit given an individual's life situation (e.g., family disruption, physical or mental illness).**

■ Cultural attitudes and beliefs can powerfully shape the values, definitions, and practices involved in marriage and childrearing. **Given the extensive cultural diversity of the United States, more research is needed that identifies how variations within and across cultures contribute to resiliency and risk in the formation and maintenance of intimate and familial relationships.**

■ The increasingly variable pathways people take in forming, dissolving, and reforming unions and intimate relations are providing an unprecedented challenge for understanding how changes in family structure and functioning affect mental health outcomes. **More research is needed that identifies how different family structures, or their changes, influence adjustment throughout life.**

■ Fundamental to understanding the critical role of family and interpersonal relationships in mental health and illness is the ability to accurately measure these phenomena. Measuring interpersonal relationships, however, is very complex. The behaviors, thoughts, and emotions that characterize relationships can be assessed as qualities of each individual, as patterns of interacting with others, or as aspects of whole-family dynamics. **Future research must pursue a systematic course that establishes the reliability and validity of family measures across groups varying in cultural background and degree of risk for psychopathology.**

■ The fact that particular caregiving styles or practices have differing effects across ages and cultures indicates that research must move beyond global conceptualizations of caregiving to discover more about how socialization processes work. **Research is now needed on the psychological processes of caregivers and children that mediate relations between childrearing practices and child outcomes.** Such an understanding should promote the development of interventions in high-risk families, such as those with depressed caregivers.

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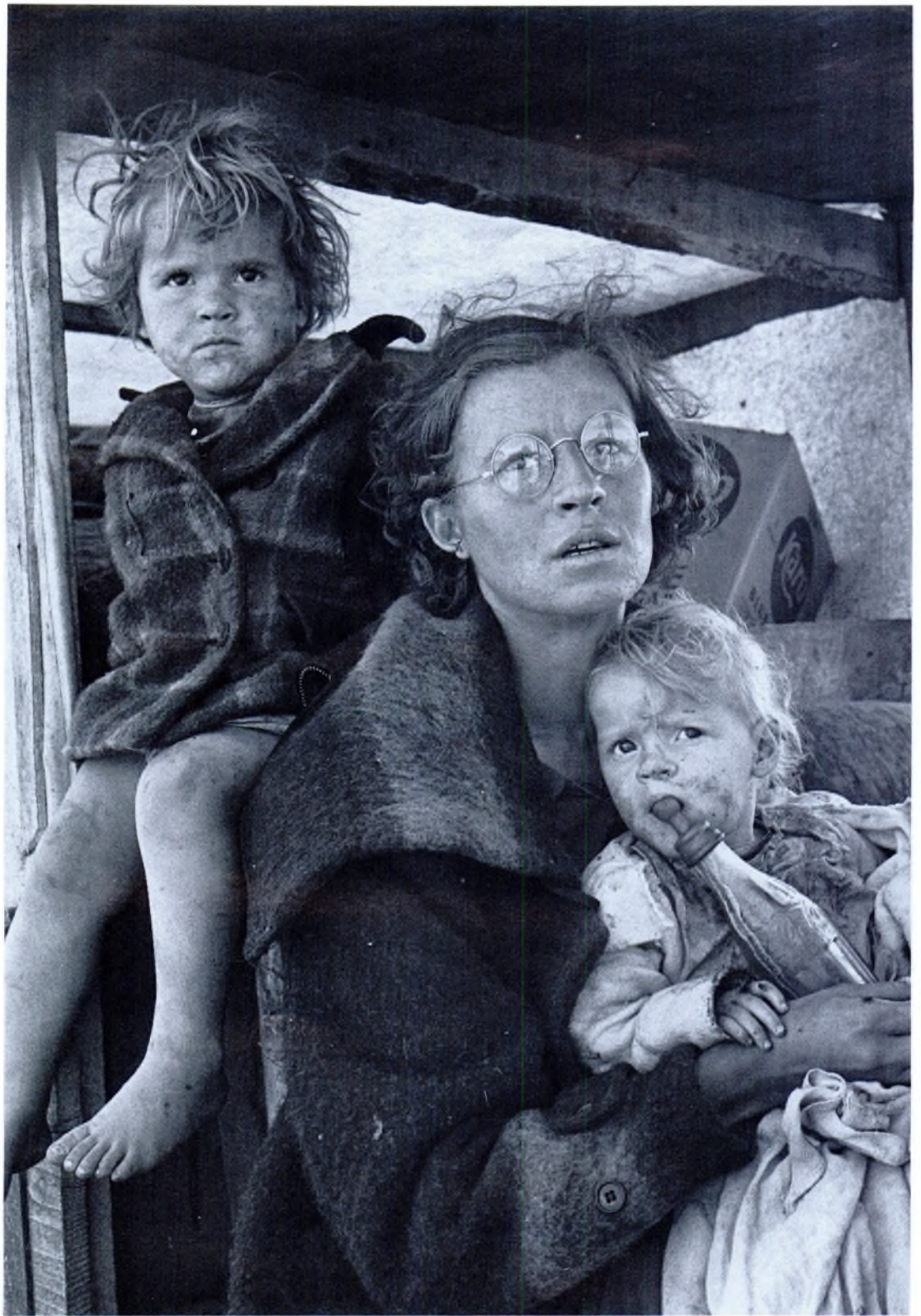"Heading West, Tulare
Lake, California," 1939.*

Photo courtesy of the Library of Congress Prints and Photographs Division and the Photoduplication Service.

# CHAPTER 7

# SOCIOCULTURAL AND ENVIRONMENTAL PROCESSES

Social, cultural, and environmental forces shape who we are and how well we function in the everyday world. The culture we belong to, the neighborhood we live in, the demographic composition of our community, and the opportunities and frustrations of our work environment all profoundly affect our mental health. Other powerful factors include whether we are rich or poor, native-born Americans or immigrants or refugees, and residents of a city or a rural area. Together, these contextual factors, interacting with our individual biological and psychological characteristics, color our experience, limit or enhance our options, and even affect our conceptions of mental illness and mental health.

Does poverty cause mental disorders or do those disorders cause some people to drift into poverty? What allows some neighborhoods to band together against drug pushers and violence while others do not? How do immigrant children adapt to public schools? What kinds of school and work environments encourage good relations among various ethnic populations? What community resources promote positive mental health in workers who recently lost their jobs? Answering these questions requires understanding our sociocultural world and the social trends and issues that reflect its complex dynamics. These issues include the growing disparity between the resources of the rich and the poor, the effects of the chang-

ing racial and ethnic composition of the United States on such social institutions as schools, and the increasing diversity of family structures related to such factors as the increase of women in the workforce and patterns of immigration.

Basic sociocultural research can help us solve many pressing public health and social welfare problems. Knowing how social processes influence attitudes and behaviors in different cultural groups can strengthen efforts to prevent AIDS and substance abuse. Discovering whether existing research findings on the parent-child-school relationship are relevant to homeless parents and children can help us respond better to their social and educational needs. Understanding the family dynamics of childrearing under varied non-traditional circumstances may aid in designing intervention programs for teenaged mothers and their children.

The increasing multiculturalism of our Nation represents both a challenge and an opportunity for behavioral science to expand its knowledge base. Such knowledge will be enhanced if researchers embrace a wide range of methods, including ethnographic approaches as well as the more typically used quantitative methods.

This chapter provides a selective overview of accomplishments in this research area as well as promising directions for the future.

We begin with a fundamental issue: how culture influences the course of mental illness.

## The Course of Mental Illnesses: The Role of Culture

In 1979, the World Health Organization (WHO) published the results of its nine-country study indicating that people with a diagnosis of schizophrenia fare far better in developing countries than they do in North America and Europe. For example, 58 percent of the patients in Nigeria and 51 percent of those in India were reported as being in full remission 2 years after their first treated episode of schizophrenia. In Denmark, by contrast, only 6 percent were reportedly in full remission at 2-year followup. Recently, a more rigorous study by WHO has supported the earlier finding of a better outcome among patients in developing countries.

It has long been thought that major mental illness is almost inevitably chronic and incurable. Research now shows that schizophrenia and many other severe forms of mental illness (such as manic-depressive illness and depression) have extremely diverse courses, ranging from complete recovery through patterns of waxing and waning, to nearly complete disability. Basic research is now exploring how social and cultural factors amplify or attenuate symptoms and disability. Several lines of study provide important clues.

Anthropological and cross-cultural studies show that cultural beliefs about the nature of mental illness influence the community's view of its course and treatment. These views may affect, in turn, the actual duration of the illness. Mexican Americans in the Los Angeles area tend to view people with symptoms of schizophrenia as vulnerable and ill, but they explain those symptoms as resulting from "nerves" and from being "sensitive" and assume that recovery is possible. In contrast, Anglo Americans in the same area are more likely to categorize the same people as "crazy," with little or no hope of recovery.

Another line of study shows that diagnoses of mental illness differ across cultures and subcultures. For example, among psychiatric inpatients in the United States, African Americans are more likely than white Americans to be diagnosed with schizophrenia and less likely to be diagnosed with affective disorder. Research has yet to disentangle the myriad possible factors, such as socioeconomic status (SES) and hospitalization, that may help to explain such differences, but several studies provide evidence of the role of culture in the accuracy of psychiatric diagnosis and assessment.

Research has revealed differences in how individuals in different cultures experience and express symptoms of mental illness. Since most psychiatric diagnosis is based on symptoms, those symptoms that are unique to certain cultures or subcultures (e.g., believing in devils, hearing voices of the dead, or describing physical sensations in vivid metaphors not used in English) may lead clinicians to misunderstand and misdiagnose individuals from cultures different from their own.

Culturally based variations in diagnosis also occur because current diagnostic categories are derived largely from research among majority populations, particularly those in hospitals or specialty psychiatric clinics. Such studies tend to support the impression that the observed expressions of illness are universal. Cross-cultural research seriously challenges this assumption. Several generations of research make it quite clear that however universal broad categories of mental illness may be, the patterns of onset and duration—and even the nature and clustering of specific symptoms—vary widely across cultures.

These findings have many practical as well as theoretical implications. For example, at present, the vast majority of medically trained clinicians in our health care system come from the white majority, while a sizable proportion of their clients—especially in public facilities—are members of ethnic minorities. In addition to attempting to increase ethnic minority participation in the health professions, we also need to use the insights of research on cultural differences to aid today's health care workers in recognizing and responding to the special perspectives of ethnic minorities.

# Sociocultural Variation in Basic Psychological Processes

Members of subcultures, cultures, and societies often share particular historical traditions, challenges, opportunities, and stresses that provide a common core of experience. These experiences create a distinctive context that influences how basic psychological processes are expressed within a given culture. By comparing attitudes and behavior across cultural and subcultural groups, researchers can clarify how diverse social experiences and conditions influence individual functioning and well-being. Such "natural experiments" are uniquely able to demonstrate the power of the social context to affect psychological strength and vulnerability.

## Culture and the Self

The sense of self is fundamental to individual identity. Increasing numbers of research studies are demonstrating that cultural experience plays a vital role in shaping this sense. One group of studies has shown that many cultures, especially Asian, stress the fundamental connectedness or interdependence of members; the self is defined in relation to others, especially one's family. This inter-

dependent view also is characteristic of many cultures in Africa, Latin America, and southern Europe. By contrast, in North American middle-class cultures, the self is defined primarily by internal attributes, reflecting a view of the self as independent.

These diverse ways of grounding individual identity are influenced by social and cultural differences in such areas as childrearing, family life, and the organization of schools. For example, studies show that in Japan and China, people tend to describe themselves in relation to their group affiliations (e.g., families, companies), while Americans usually describe themselves in abstract individual characteristics, such as hard-working or self-confident.

These distinctions operate not only for geographically and traditionally segregated groups (e.g., nations, East versus West), but also for subgroups defined by gender and ethnicity that have developed their own patterns of social beliefs and practices. For example, even within the independent culture of the United States, researchers find that ethnic minorities and women are more likely to define themselves in interdependent terms than are men or members of the white majority.

## Cultural Influences on Psychological Experience

### The False Uniqueness Effect

Cultural influences have been found to affect aspects of psychological experience in unexpected ways. For example, many years ago a research program focused on a presumably basic phenomenon, the "false uniqueness effect"—a tendency to underestimate the extent to which others also possess one's desirable traits. As early as 4 years of age, American children think they are better than most others, while American adults typically believe they are more intelligent and attrac-

tive than average. In addition, a national survey of American students showed that 70 percent thought they were above average in their ability to lead; none thought they were below average in their ability to get along with others, and 60 percent thought they were in the top 10 percent.

Cross-cultural research has revealed significant gender and cultural variation in the strength of this effect. It is stronger, for example, in men than in women in North America and is very low for both men and women in Japan, Korea, and Thailand. In our culture, the effect appears to be one way of enhancing self-esteem, a quality closely related to mental health. Among cultures that stress interdependent concepts of self, self-esteem (and, therefore, mental health) is based much more strongly on satisfactory relationships with others. These findings suggest that our theories of self-esteem and ways to enhance it need to be approached from a sociocultural perspective, especially with regard to women and people from different cultures.

### The Fundamental Attribution Error

Culture plays a role in how we view other people and explain their actions. Research has shown that in cultures that stress an independent concept of self, people often infer that other people's behavior stemmed from their internal attributes (such as personality, attitudes, and abilities) even when obvious situational factors may have played a role in their actions.

This tendency is called the "fundamental attribution error." However, it may not be as fundamental as once thought. Cross-cultural research has shown that in cultures that stress interdependence, people tend to explain others' actions in terms of situational factors rather than internal or personal factors. Hindu Indians, for example, explain social events primarily in terms of a person's social

roles and obligations rather than in terms of that individual's personality. Similarly, Japanese are less willing than Americans to draw inferences about people's attitudes from their behavior. Furthermore, Asians tend to be unwilling to infer people's emotional states from their facial expressions, although Americans readily do so.

## Culture and Emotion

In 1872, Charles Darwin published "The Expression of Emotion in Man and Animals," in which he proposed that some emotional expressions, such as smiles, frowns, and looks of disgust, are innate and universal. He saw these facial expressions of emotion in every culture studied and concluded that such emotions, and the way they are expressed, must be part of our biological heritage.

Subsequent research has shown that there are, indeed, many similarities across cultures in facial expressions of emotion. However, cross-cultural psychologists are finding that how we experience emotions may vary from culture to culture. When researchers asked people in North America to pose several positive and negative emotional expressions, such as smiles and frowns, they found that such expressions caused changes in people's feelings and in the responses of their autonomic nervous systems. Smiles resulted in positive feelings, and frowns or expressions mimicking negative emotions caused negative feelings.

When people in a non-Western culture (the Minangkabau of Sumatra) posed various emotional expressions, their autonomic responses were very similar to the North Americans'. This finding suggests that the physiological and neurochemical networks connecting sensory signals from the face to the autonomic nervous system are largely unaffected by cultural differences. However, at the subjective level, a striking cross-

cultural difference was observed. Unlike the Americans, the Minangkabau who posed various expressions did not report any corresponding changes in their subjective feelings.

This difference may reflect the fact that people from many cultures tend to interpret certain bodily changes with somatic explanations, such as fatigue, muscle tension, and headache, whereas Westerners tend to focus more on psychological states. These different explanatory styles predispose people to perceive and communicate certain classes of bodily sensations while ignoring or deemphasizing others. This interpretation is consistent with well-documented cross-cultural differences in the experience and communication of symptoms of depression.

## Culture and Motivation

Classic research on achievement motivation has shown that, in Western cultures, the desire for excellence is linked closely with seeking and actively striving for individual success. However, this finding has subsequently been shown to be more applicable to men than to women, whose concerns also involve connectedness with others.

Excellence may also be defined in terms of broad social goals and group success, as often occurs among Asians. Research in China, for example, has shown that those individuals who are most motivated to excel take most seriously their duties and obligations to family members, especially parents.

Because achievement motivation is important to mental well-being as well as success in school and other life endeavors, researchers are now studying sociocultural factors that influence such motivation. Recent cross-cultural studies on school achievement, for example, have raised important questions about the effect of cultural factors. In a comparison of the mathematics achievement of

students in the United States, Japan, and Taiwan, the U.S. students consistently performed least well. This "achievement gap" appeared as early as first grade, increased dramatically by fifth grade, and was maintained at eleventh grade.

Other studies have shown that this effect, which cannot be attributed to differences in intelligence, reflects the impact of diverse factors, including how parents and students in U.S. and Asian families explain success and failure. Chinese and Japanese fifth graders and their mothers stress the importance of hard work as the route to success; American mothers, however, give greater emphasis to the importance of a child's "natural" ability. This study suggests that Asian parents and children view working hard and persisting in mathematics as simply a requirement for achievement, while Americans regard the need to try harder as evidence of low innate ability and are less likely to value or encourage such effort.

Findings such as these emphasize the importance of understanding the role of cultural factors in other aspects of motivation as well. For example, models of rational choice and decisionmaking have been highly influential in social and behavioral science in the United States. However, their relevance, nature, and operation need to be validated in other sociocultural settings.

## Race and Ethnicity in a Multicultural Society

Recent projections indicate that people of color—African Americans, Hispanic or Latino Americans, Asian Americans, and Native Americans—who constitute 18 percent of the U. S. population now, will account for 47 percent by the year 2050. Our country's racial and ethnic diversity is being increased yearly by immigrants and refugees

from many parts of the world. These demographic changes raise many basic research questions with mental health implications: What are the dynamics of conflict between indigenous and immigrant populations? What are the mechanisms that affect immigrant children's acculturation? How does the workplace influence and respond to cultural and ethnic diversity?

As cultural diversity steadily increases in the United States, our scientific understanding of social and psychological functioning and mental health must be based on knowledge of these varied populations and their relations with each other. It is especially important to understand how belonging to an economically disadvantaged racial, ethnic, or cultural group can harm or help mental health and psychological functioning.

During the 1970s and 1980s, some observers suggested that race and ethnicity were of declining significance and hence worthy of "benign neglect." Changes in demographics as well as recent research findings strongly challenge that attitude. Race and ethnicity continue to be major risk factors for mental and physical illness and for psychosocial dysfunctions. For example, in 1988, the death rate among African Americans between ages 25 and 44 was more than double that of white Americans. African Americans and Hispanic Americans are at higher risk for many mental disorders. Some of this increased risk is due to the lower average SES of most racial and ethnic minorities and their concentration in more hazardous urban environments. However, race and ethnicity have health consequences not simply accounted for by SES and place of residence.

## Discrimination and Mental Health

Many people assume that changing attitudes, laws, and policies in the public and private sectors have largely eliminated racism and discrimination (and even created reverse discrimination). Recent research indicates, however, that racial and ethnic discrimination continues to be a daily fact of life for many people, leading to increased stress and its psychological consequences.

Discrimination is found, for example, in employment and housing practices, as revealed by a study conducted in Washington, DC, and Chicago. In this research, both black and white applicants were sent to seek employment after having been matched as carefully as possible on all attributes that could affect a hiring decision (e.g., age, physical size, education, experience, and other "human capital" characteristics as well as intangibles such as openness, apparent energy level, and articulateness). Differential treatment in job offers occurred 20 percent of the time, with the white applicant three times more likely to be favored. A similar study conducted with Hispanic and Anglo applicants in Chicago and San Diego found differential treatment 30 percent of the time, with the Anglo applicant 2.7 times more likely to be favored.

Other studies document continuing discrimination in housing and suggest that almost all racial and ethnic minorities, including middle-class suburban residents, experience discrimination. Its forms include avoidance and rejection by strangers, suspicion and poor service in public accommodations, verbal epithets, and police harassment.

Coping with such discrimination can result in chronic levels of stress that have physical and mental health consequences. This discrimination-related stress is exacerbated, researchers have discovered, by empathizing with the discriminatory acts experienced by other members of their group. In one study, for example, researchers found elevations in blood pressure among black subjects when viewing videotaped vignettes of discriminatory acts toward blacks, such as poor service, verbal abuse, and police threats.

In addition to increasing stress, the experience and anticipation of discrimination may also disrupt social interaction and behavior in ways that can undermine mental health treatment. For example, a distrust of whites may lead some racial and ethnic minority group members to have diminished confidence in white therapists' ability to address their needs in counseling.

Pervasive direct and indirect experiences of discrimination and stigmatization place an individual's sense of identity under constant attack. One new line of research indicates that, in anticipation of academic stigmatization in college, some African American students devalue and "disidentify" with academic activities. This reaction has both negative and positive effects: It harms school grades, but it preserves self-esteem.

An intervention to address disidentification has shown that a program of academic support and intergroup relationships can improve academic performance while maintaining a strong sense of self. Understanding the psychological processes that mediate and sustain such self-protective behaviors among people victimized by prejudice and discrimination in our society needs to be a high research priority.

## Acculturation, Diversity, and Adaptive Coping

As the United States becomes more culturally diverse, many members of racial, cultural, and ethnic minority groups are attempting to cope with the conflicts created by their "marginality"—the experience of living simultaneously within more than one cultural context. The concept of acculturation has historically been applied only to immigrant groups, but it is also relevant in understanding the experience of indigenous minority groups coping with a mainstream majority culture that has different values and practices discrimination and stigmatization.

Researchers studying this bicultural adaptation process describe several alternative strategies used by members of the non-dominant culture in coming to terms with marginalization and stigmatization. These strategies include assimilation (being absorbed into the dominant cultural group), acculturation (acquiring the salient elements of the dominant culture), alternation or biculturalism (becoming proficient in two cultural systems and switching between them as the situation requires), and multiculturalism (maintaining a separate cultural identity while working in collaboration with other groups to achieve mutual goals).

The processes involved in working out these varied accommodations have important implications for mental health and well-being. For example, these coping strategies often put the individual's own culture in a subordinate position. This dilemma presents challenges and conflicts that can increase stress and mental discomfort. A key research task is to understand better how these conflicts are formed, which strategies are most effective in coping with them, and what possibilities exist for reducing their negative health and mental health consequences.

Some research has shown positive effects of biculturalism on the adjustment of Hispanic youth. One study showed that having the ability to develop social skills characteristic of both Hispanic and Anglo cultural contexts lessened youths' chances of experiencing family or school conflict or of becoming involved in illegal drug use. This finding was especially true for youths whose parents were also bicultural.

While on practical grounds immigrants need to acquire skills in their new cultural context, on psychological grounds they often need to remain rooted in their own culture. A study of Southeast Asian refugees assessed the mental health of immigrants who came to the United States with other family mem-

bers or who came to cities with a sizable population of individuals from the home culture. After 1 year in the United States, these refugees were less depressed than were others who had emigrated alone or who lacked ties with people from the home culture.

Studies have shown that variations in age, gender, family structure, SES, and country of origin are but a few of the factors influencing how and how well people cope with the task of belonging and adapting to a multicultural environment. Within any population of individuals experiencing similar stressful circumstances, some will be more "environment resistant" than others.

Recent studies on racial and ethnic minorities and refugees have begun to illuminate the environmental sources of strength, resilience, and hardiness that some people show in the face of adversity. As an example, analyses of the NIMH-funded National Survey of Black Americans indicated that diverse supportive influences aid the general coping, adaptation, and mental health of many African Americans. These sources of support range from informal social networks and extended families to such community resources as ministers and religious groups.

## Ethnic Relations

The intensification of interracial conflict between minority and majority groups born in the United States, as well as additional tensions between native-born Americans and immigrant groups, has once again placed issues of ethnic conflict in the forefront of our national consciousness. Do such conflicts stem from competition for scarce resources or differences in cultural values and beliefs? Do they reflect genuinely different cultural perspectives brought by divergent groups to the same interaction? Answering these questions requires understanding the ethnic identities involved and the stereotypical thinking that influences the groups'

interpretations of one another's intentions and behavior. We also need to understand how social institutions set the conditions for intergroup conflict or cooperation.

A consistent finding from social psychology research is that biases operating between groups are more strongly influenced by preferences toward their own members (in-group bias) than by negative feelings toward members of other groups. But when—as a response to bias, discrimination, and stigmatization—members of ethnic groups increasingly interact only with members of their own group, that interaction ultimately heightens their negative feelings toward out-group members. How can the tension be resolved between the feeling of belonging and protection provided by in-group identification and the resulting estrangement with out-group members?

One promising line of research suggests that it may be possible to capitalize on in-group bias by creating a new, superordinate group with which members of different groups can identify. Merging two groups reduces favoritism toward former in-group members, increases liking for former out-group members, and heightens feelings of oneness in the new group situation. Field experiments reveal that these positive effects occur whether dealing with ethnic differences in high school or with newly merged corporate employees from diverse parts of the country.

# Socioeconomic Status and Mental Health

"The pauper class furnishes, in ratio of its number, sixty-four times as many cases of insanity as the independent class." That was the finding of one of the first epidemiologic studies in the United States, which was car-

ried out in mid-19th century Massachusetts. Despite dramatic changes in our notions of mental disorder and social stratification, the fundamental relationship between mental illness and SES in the United States was reaffirmed in 1990 in an epidemiological survey based on a standardized psychiatric diagnostic system.

For the American population, the highest rates of diagnosable mental disorder were found among the groups with the lowest SES—usually defined in terms of education, income, or occupation. For example, people with less than a high school education or $20,000 annual income experienced three or more psychiatric disorders in the past year at almost four times the rate found among those with a college education or annual income of $70,000 or more.

Mental health differences related to age, race, or sex appear modest in comparison with these socioeconomic differences. To some extent, these differences may reflect the fact that having a mental disorder can cause people to drift into poverty. However, recently improved methods of research design and data analysis have shown that these differences also reflect a reverse effect—the powerful influence of poverty on mental disorder.

For example, recent research on schizophrenia suggests that while poverty does not cause the disorder, it is powerfully related to the experience of those suffering from it, their resources for coping with it, and perhaps their likelihood of recovery. However, socioeconomic or other psychosocial deprivations and stresses do seem to play a causal role in both the onset and course of depressive, substance abuse, and antisocial disorders. Further, researchers now know that virtually all major psychosocial risk factors for mental illness (including chronic and acute stress, lack of social relationships and supports, and lack of control and mastery) are

more prevalent at lower socioeconomic levels. Alleviating acute socioeconomic deprivation can often lessen the more serious long-term psychological consequences of these disorders.

## SES and Mental Health Across the Lifespan

The long-term behavioral and emotional effects of socioeconomic disadvantage during childhood can be particularly severe. Recent research shows that, during childhood, low SES is one of many environmental factors, including poor parental mental health and deprived family and community environments, that can contribute to later delinquency, school dropout, premarital childbearing, and poor parenting. Studies in the United Kingdom and the United States indicate, however, that positive family relationships and childrearing practices, or preschool support programs for children and families, can markedly reduce or eliminate these later adverse effects.

Other factors have been shown to lessen the negative impact of socioeconomic disadvantage on adults. Recent research on the long-term mental health impact of the Great Depression has shown that economic hardship during the 1930s was, on average, more deleterious for men's later mental health than for women's, especially if the hardship was sustained or if the men showed signs of emotional instability prior to the Depression or lacked supportive spouses.

Interestingly, the Depression actually enhanced the later resilience and competence of some women—those who entered the 1930s in good health, were gainfully employed during that decade, and had supportive marriages. Such a finding supports the need for more indepth research on factors related to hardship experiences that can actually provide mental health *benefits* to some individuals in some circumstances.

Taken together, these studies indicate that many social and personal characteristics and resources may exacerbate or buffer the impacts of stress and other health hazards related to SES. Most prominent among these are social relationships and supports as well as personal control, mastery, or self-efficacy in life and work. Understanding these processes in a larger sociocultural context may suggest important new ways to weaken the link between low SES and psychological distress and disorder.

## SES, the Family, and Work

Low SES often affects mental health through its impact on the family. Economic problems can severely disrupt skillful parenting and family interactions, with adverse long-term mental health implications for children. A striking finding from recent research is that mothers faced with chronic financial problems interact with their children in a more rejecting and inconsistent way (either harshly punitive or indifferent about the same behavior) than do mothers not faced with these problems. The caregiving behavior of the financially strained mothers resembles that of mothers with clinical depression. Discovering how these findings apply to both single- and two-parent families across varied cultural, ethnic, and racial groups represents an important future research direction.

Insecurity about job stability, increases in overtime, and disruptions in childcare arrangements can also have negative effects on family life. Parents' efforts to increase income by working longer hours detract from the time, energy, and attention they have for each other and their children.

Reduced earning power is not the only economic stressor that affects family life. The nature of jobs and work environments varies with SES, and more than three decades of research suggests that the nature of one's work is critical to one's attitudes, intellectual flexibility, emotional well-being, and approaches to childrearing. People whose work is substantively complex and offers opportunities for self-direction (generally characteristic of higher SES jobs) place greater value on independence and are less concerned with conformity than are those in less-demanding and less-autonomous jobs. As parents, people with more complex occupations display more warmth and involvement and report using less physical punishment with their children than those in occupations offering less complexity and self-direction.

Alternatively, research has shown that work that is routine, heavily supervised, and low in complexity—generally characteristic of lower SES jobs—tends to produce a sense of hopelessness and alienation that undermines beliefs about the possibility of control in other aspects of life and causes psychological distress. When work experiences leave parents feeling devalued and emotionally distressed, they are less able to be emotionally supportive of children and to provide them with responsive, stimulating environments.

These SES-related occupational conditions affect adults' mental and physical health as well as their childrearing practices. However, this only partially accounts for the substantial differences in psychological distress and disorder across SES levels. Because many people do not work, or work only part-time or part-year, an equally strong research focus is needed on how and why education and economic well-being affect behavior, psychological functioning, and social conditions of life in ways that either promote or damage mental health.

## Changing Work Roles and Mental Health

Few social changes have so altered the sociocultural landscape in recent years as the

increasing number of women who have entered the work force. Social science research over the past decade has begun to describe the impact of this major social transformation. The findings have sometimes confirmed and sometimes challenged conventional wisdom and previous scientific theories.

Many people expected that women's growing participation in the labor force would adversely affect their own well-being and that of their spouses and their children. However, research during the past decade consistently indicates that female employment per se has few negative effects—and even some beneficial ones—on women, their spouses, and their children.

One of the most consistent, and perhaps least expected, findings is that even among married women with children, employment generally has positive effects on women's psychological well-being. Married women who are employed have less depression, anxiety, and other forms of psychological distress than do married women who do not work outside the home. Although a married woman's employment has less clear benefits for her husband's well-being than for her own, it generally does not increase his distress.

Paid work benefits women and their families by decreasing economic hardship and by promoting husbands' involvement in the division of household labor, which in turn improves the women's mental health. Employed wives provide about 31 percent of all family income. While only about 20 percent of the husbands of employed women share the housework and childcare *equally*, this figure is almost triple the proportion of husbands (7 percent) that do so if their wives are not employed. The more a wife earns compared to her husband, the greater is his share of the housework and childcare; the more a husband shares the household work, the lower is his wife's level of depression.

Early studies had suggested that married women's employment decreased both partners' marital satisfaction. It now appears that wives' employment reduces marital satisfaction only in those traditional families in which, despite the belief by both spouses that the wife's place is in the home, she needs to work for economic reasons while retaining full responsibility for the home. The increasing diversity of family arrangements in our society needs to be taken into account as this important line of research continues.

It is now clear that the emotional well-being of working mothers depends not only on the division of labor in the home but also on the availability of childcare. One study has shown that when women are primarily responsible for the care of children, have major responsibility for making daycare arrangements, but live in a community where quality care is scarce and expensive, they are likely to obtain less benefit from paid employment than would men. Another study revealed that when women and men share household labor and childcare equitably, and when satisfactory, affordable childcare is available, mothers who work have greater emotional well-being than mothers who do not.

The nature of women's employment affects their behavior toward their children. One study, for example, has shown that among working mothers matched for education, income, and family size, mothers whose occupations give them greater opportunity to solve problems and to address varied tasks provide more support to their children at home than do the other mothers. Such women also offer their children a greater range of stimulating materials, restrict their exploration less, and are warmer in their interactions. Conversely, mothers whose work is repetitive and routine seem less available emotionally to their children and less able to assist their development.

The increased employment of women is

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likely to challenge old marital roles, family commitments, and family satisfaction. When husbands had clear responsibility for providing for the family, wives usually subordinated their own job interests to those of their husbands, with little room for bargaining. As beliefs about gender roles change, husbands and wives may face greater conflict as they struggle to work out jointly satisfying occupational and family arrangements.

Ironically, women's increased access to better jobs—defined in terms of wages and occupational complexity—may increase marital conflict. Wives with good jobs may be less willing to subordinate their own preferences and forego job opportunities. Husbands with good jobs may feel entitled to claim breadwinner privileges and be less willing to jeopardize their own careers by accommodating to their wives.

One intriguing hypothesis is that, at least in the short term, occupational conditions that enhance individual well-being will challenge those aspects of the marriage involving previously established gender roles. Whether such a potential conflict will emerge and under what conditions it might become a long-range asset or liability to the marriage are important research questions.

# Communities, Organizations, and Mental Health

Just as the family provides a critical context for individual mental health and functioning, communities and organizations such as churches, schools, and neighborhood development associations strongly influence the functioning of both families and individuals. Research on communities was central to the early development of social science in the 1950s. As methods of collecting and analyzing data on populations of individuals were developed in the

1960s and 1970s, many findings suggested that characteristics of families and individuals were the primary determinant of individual functioning and mental health; community and organizational factors appeared to be less important.

Further advances in theory, methods, and research over the past decade have indicated, however, that the characteristics of neighborhoods and of educational, community, and work organizations are more influential than previously believed. Indeed, they are often significantly related to depression, infant mortality, child abuse, criminality, school performance, and the ability to find employment.

## Risk and Protective Factors in Communities

Research documenting an increase in concentrated poverty and a decrease in jobs in urban areas, particularly among African Americans, has stimulated interest in how living in a high-poverty community contributes to joblessness, family disruptions, out-of-wedlock births, crime and delinquency, substance abuse, and mental disorders. Current findings suggest that as neighborhood composition changes from a working-class or middle-class environment to one of increasing poverty, residents are more likely to face severely reduced access to jobs. They also have fewer social networks and role models of stable, job-holding, intact families.

The structure of such communities has been found to limit the opportunities for children and adolescents to have access to parental and nonparental supervision. Community disorganization is also associated with increased numbers of births to single mothers. However, in terms of impact on children, mothers' marital status is not as important as household composition. Research has shown that when single mothers are the only adults

in the household, children are at greater risk for maladaptive outcomes than when other adults are present as well. Further study is now needed to assess the extent and intensity of neighborhood effects. Even more important, research needs to specify which aspects of communities, through which kinds of mechanisms, contribute to positive or negative outcomes for children and adolescents.

Effective community support systems can improve parenting or even overcome the effects of poor parenting. One study of two demographically similar neighborhoods, one with far more cases of abuse and neglect than the other, suggested that the neighborhood with less child maltreatment had more highly developed social networks and organizational supports for childrearing. Another study showed that close social and organizational networks in a community fostered child supervision and held afloat marginal families with poor parenting skills.

Both attachment to schools and participation in community organizations such as churches and religious youth groups, school-based groups, and scouts, have been shown to protect youths from delinquency and anti-social behavior. In addition, adults' participation in community organizations has been related to lower rates of child maltreatment and decreased crime rates in those communities. More research is needed to explain how these beneficial effects take place and to what extent other features of individuals or communities may protect residents from maladaptive outcomes.

## Instability in Community and Organizational Contexts

A growing body of evidence indicates that instability in people's relationships to communities and organizations is often linked to poor physical and mental health. For example, residential mobility, which typically entails breaking and reestablishing connec-

tions with most settings of daily life, is often associated with considerable distress, described by one author as "grieving for a lost home."

Research suggests that the mental health impact of residential moves depends in part on their psychological meaning. More adverse effects occur when moves are forced, when the new setting does not meet residents' needs, and when few attractive alternatives are available. Even desirable moves, such as those associated with a job transfer or promotion, can have negative mental health effects on workers and their families.

Homelessness, an extreme form of residential instability, is strongly associated with mental illness; an estimated one-third of homeless people in the United States have severe mental disorders. Yet recent research suggests that most homelessness results from factors such as adverse economic conditions and the unavailability of affordable housing rather than from the disabilities associated with mental illness.

Further, although people who suffer from severe mental illness are more likely than others to become homeless, recent studies show that, in some cases, homelessness precedes and may precipitate depression and alcoholism. It was once believed that impoverished social networks are a cause of homelessness, but one recent study shows that homeless families receive more support from families and friends prior to entering a shelter than do poor families with homes. Eventually, however, they wear out their welcome in others' homes.

Most of our knowledge about the relationship between homelessness and mental illness still comes from studies of groups of homeless people at one point in time. To understand the sources and impact of homelessness, more longitudinal studies are

needed that follow homeless people over many months, and even years, ideally beginning with high-risk groups before they become homeless.

Recent research has shown that residential instability may be especially problematic for children. In homeless families, children suffer an excess of health problems, developmental delays, psychological problems, and educational underachievement compared with children in other low-SES families. Migrant and refugee children have been shown to have elevated rates of anxiety, depression, somatic complaints, and difficulties in establishing relationships with peers.

More research is needed to determine the factors affecting children's vulnerability or resilience in the face of these environmental stressors. By understanding the processes involved, we may be able to protect homeless children, migrants, and others who experience high rates of residential mobility. Another important research task is to determine whether emotional damage to children is permanent or reversible once the family has obtained stable housing.

## Research Directions

Important directions for future research on sociocultural and environmental processes include the following:

■ The exploration of the role of cultural factors in basic processes of cognition, motivation, and emotion has only begun. **Research is needed that explores how ethnicity influences social cognition and achievement motivation as well as how cultural differences affect the expression and labeling of emotion. More generally, cross-cultural research is needed to distinguish what is**

**universal in human behavior from its more culturally specific aspects.**

■ Research shows striking cultural differences in the diagnosis and course of major mental disorders. However, the processes that vary across cultures and underlie these differences have yet to be clarified. **Research is needed on such issues as the role of culture in the expression of psychiatric symptoms, the factors that place poor and minority persons at elevated risk for misdiagnosis and involuntary hospitalization, the influence of social and cultural processes on the course of mental illness and the prognosis for recovery, the differences among subcultures in patterns of caring for people with mental illness and how families cope with the burden of a mentally ill member, and the differences among cultural and subcultural views of mental illness and its treatment.**

■ Sociocultural markers, such as race, ethnicity, and immigrant status, continue to play an important role in the social fabric and social life of our society. **Research is needed on how and in what settings ethnic discrimination continues to be expressed and how it affects various groups.**

■ Increasing cultural diversity makes clear the importance of research on interracial and interethnic dynamics. **Increased research is needed on three issues: (1) explicating more clearly the mechanisms through which discrimination in school and work settings takes its toll on mental health, (2) discovering how both individuals and social and community settings develop successful strategies for dealing with disempowering situations, and (3) clarifying how the mental health of immigrants is influenced by such factors as**

acculturation, SES, the presence or absence of an accessible ethnic community, the ethnic composition of schools, and support systems available in the work environment.

■ The consistent and pervasive implications of low SES for the mental health of children and adults has been well described. Basic research is now needed to identify and study those processes that mediate the effects of SES on the mental health of children and adults. It is critical to understand how SES is expressed in the lives of individuals, including its implications for children's school performance, the effects of low-paying and routine jobs on family life, and SES differences in the availability of health care and counseling. It is also important to examine the variations among groups of similar SES but of differing cultures, races, and geographical regions.

■ A critical social change in the United States has been the enormous increase of women in the work force. Recent studies have revealed important and unexpected effects of this change on marital relationship, parenting practices, and children's adjustment. Future research should emphasize how the interdependence of the work environment, the husband's supportiveness for the wife's work, and the varying kinds of family constellations found in today's society affect the well-being of both parents and children. Specific attention should be given to discovering the kinds of arrangements that succeed and the kinds of school or work environments that prevent the potential negative effects of this changing pattern on children and their parents.

■ New theories and methods indicate that community contexts can have substantial effects, both positive and negative, on mental health and psychological functioning. Earlier studies focused heavily on documenting such effects. Research now should focus on identifying key aspects of communities that may threaten or protect mental health and well-being. Promising research directions include the contributions of community structure to violence, the effects of poverty on community life and opportunities, the contributions of communities to access to health care, the supportive role of social networks in buffering stress and promoting coping, and the coping processes necessitated by instability in educational, occupational, and residential environments. An important methodological issue concerns developing improved ways to measure the microsystems that comprise the community environment.

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# STRENGTHENING BASIC BEHAVIORAL SCIENCE RESEARCH

Since its founding in 1948, NIMH has regarded a vigorous program of basic research in behavioral science as essential to its mission. As the preceding pages have demonstrated, this investment has paid off handsomely. Growing scientific understanding of normal cognitive, emotional, motivational, interpersonal, and sociocultural processes has clearly provided a fundamental knowledge base for treating and preventing mental illnesses. To assure the continuing contributions of NIMH-funded basic behavioral science research to the growth of knowledge and its application to improved mental health, the National Advisory Mental Health Council (NAMHC) makes the following essential recommendations.

## 1. Increase Support for Investigator-Initiated Research

In the United States, scientific work has always been organized primarily around the individual investigator. In basic behavioral science research, most of the major advances—including those described on the preceding pages—have been made by individual investigators. However, at present, only about 15 percent of approved applications for investigator-initiated basic behavioral science research are being funded at NIMH. This rate is inadequate to sustain the field. The resulting losses in knowledge and its potential applications can be expected to be cumulative and dramatic, as experienced researchers shift to other areas of study and aspiring researchers choose other career paths.

Accordingly, NIMH should reaffirm and strengthen its commitment to supporting programs of basic behavioral science research initiated by individual investigators. Such a commitment is essential to capitalize on the research opportunities presented in the preceding chapters.

■ **The NAMHC recommends an increase in support for NIMH basic behavioral science research. Incremental increases of $25 million in fiscal years 1995-98 (plus 10 percent annual adjustments thereafter) would permit funding of regular research awards, small grant awards, career awards, and the new Behavioral Science Track Awards for Rapid Transition (B/START) to the 35th percentile. Applications in this percentile range have typically received evaluations of scientific merit in the outstanding and excellent categories.**

## 2. Increase Support for Research Training

Equally essential to the fulfillment of these research recommendations is an expansion

of support for research training. The number of full-time predoctoral and postdoctoral training positions supported by NIMH in fiscal year 1994 is no higher than in fiscal year 1981 and is approximately 20 percent lower than the average for fiscal years 1976–80. This low level is particularly troubling given dramatic increases during the past two decades in the levels of knowledge and specialized training needs in all the research fields represented in this report as well as in other fields relevant to NIMH.

In basic behavioral science research, two areas in particular warrant special attention and increased support: training focused on research methods, statistical approaches, and computer simulation techniques (see Recommendation 6 below) and training in sociocultural perspectives relevant to mental health. The latter research area, involving disciplines such as community psychology, sociology, and medical and cultural anthropology, has been seriously underrepresented at NIMH since the early 1980s.

■ **The NAMHC recommends an increase in support for research training in basic behavioral science. Incremental increases of $1.5 million per year, plus annual adjustments of 10 percent, would support 10 new National Research Service Award (NRSA) institutional training programs (estimated 50 training positions) per year plus 20 new individual NRSA fellows per year.**

### 3. Preserve Expert Review of Basic Behavioral Science

Currently, the basic behavioral science research programs covered in this report are reviewed primarily by four NIMH Initial Review Groups (IRGs): Child and Adolescent Development, Risk, and Prevention; Social, Personality, and Group Processes; Perception and Cognition; and Psychobiology, Behavior, and Neuroscience. Other review groups have less frequent or only occasional involvement: Health Behavior and Prevention, Violence and Traumatic Stress, Child Psychopathology and Treatment, Clinical Psychopathology, and Mental Disorders of Aging. Various special review committees (SRCs) also make a contribution. At present, the collective range and depth of basic behavioral science research expertise in these review groups is the absolute minimum that is required for advancement of the field.

In the past, more IRGs were available to cover the vast range of proposals in basic behavioral science. Recently, for example, an entire IRG was devoted to the critical research areas of emotion and personality. This IRG has now been dissolved due to a shortage in personnel. Further, it has been many years since any basic-research IRG has had substantial representation from fields such as sociology and anthropology. Yet reviewer expertise in these areas will be critical for reinvigorating research in sociocultural factors in mental health after a nearly 15-year hiatus in Federal support.

■ **Given the large volume of basic behavioral science research supported by NIMH and the extensive variety of conceptual and methodological approaches encompassed within this research area, the NAMHC recommends that NIMH study the possible impact of merging its peer review system with the review system of the NIH Division of Research Grants (DRG). Specific attention should be given to the impact of a merger on the review of grant applications in basic behavioral science. As currently structured, DRG committees cover a broad range of biomedical science and are not well specialized in behavioral science.**

## 4. Encourage Basic/Clinical Research Collaborations

As highlighted in this document, some of the most notable recent advances in our understanding of health and illness have occurred at the interface of basic behavioral science and clinical research. Investigations of "Type A" personality and heart disease, cognitive psychology and Alzheimer's disease, psycholinguistics and stroke-induced language impairment, and neural network models and schizophrenia are examples of the fruitful intersections between basic behavioral science research and clinical research.

To capitalize on these areas of scientific exchange, NIMH should establish research centers at which basic behavioral science researchers collaborate with clinical researchers who focus on defined psychological or medical disorders. Without such structures, disciplinary boundaries, limited access to patient populations, and physical distance between basic behavioral science departments and clinical facilities often inhibit interdisciplinary exchange. Centers, which can include shared administrative, methodological, technological, and subject/patient resources, would greatly facilitate the close working relationships needed for meaningful interchange.

The benefits of collaboration are mutual. Clinical research will be enriched by the new concepts and sophisticated methods offered by basic research, while the validity and specificity of the theories of basic research will be increased by the rich stock of clinical data. Relevant clinical disciplines would include psychology and a range of medical specialties (e.g., psychiatry, neurology, pediatrics). Potential centers might include those focused on cognitive neuropsychology, language disorders, genetic disorders, developmental psychopathology, personality disorders, behavioral/cognitive therapy, and behavioral neuroimaging.

■ **The NAMHC recommends the establishment and support of NIMH basic/clinical research centers. Incremental increases of $1 million per year for 5 years (plus annual adjustments of 10 percent) would support one new interdisciplinary center per year.**

## 5. Preserve and Expand Facilities for Research on Behavioral and Social Processes in Animals

Research on animal behavior has illuminated many significant aspects of human behavior, such as motivation and emotion, learned helplessness, the social acquisition of anxiety, behavioral shaping, mother-infant bonding, and conflict resolution. Behavioral science research on nonhuman animals helps to clarify biological influences on human behavior and permits tests of experiential influences on behavior that cannot be performed easily or ethically on human subjects. To assure the quality and continuity of such research, adequate resources are needed.

Of particular importance for such research are long-term animal colonies and facilities for diverse species. Collectively, these facilities should provide the following:

- Serve as regional resources for many research programs.

- House diverse species for cross-species comparisons.

- Maintain animals in conditions as natural as possible.

- Establish and maintain long-term colonies for the collection of longitudinal data.

- Use state-of-the-art methods for recording and analyzing individual and group behavior.

- Offer laboratory facilities, equipment, and expertise for molecular genetic and immunological studies as well as for biobehavioral studies using procedures such as magnetic resonance imaging, positron emission tomography, and telemetry of physiological functioning.

■ **Because the costs of establishing and maintaining long-term animal facilities far exceed the budgets and longevity of typical research grants, the NAMHC recommends establishing several new regional facilities for animal research. NIMH should also explore strengthening existing centers, such as the NIH Regional Primate Research Centers and the Yerkes Primate Center in Atlanta, in collaboration with other interested Institutes and Agencies. Incremental increases should be provided to support this potentially multi-Institute, multi-Agency initiative.**

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### 6. Strengthen the Methodologies of Basic Behavioral Science Research

Taking advantage of the research opportunities described in this report depends on the continued development and refinement of sound scientific methodologies and measures. The significant advances recently made in understanding the role of emotion in adjustment and disorder as well as the breakthroughs in understanding the capacity for learning and memory in infants would have been impossible without the development of sophisticated methodological paradigms, reliable measurements, and advanced statistical analyses.

Developing accurate research methodologies is particularly challenging in behavioral science, given the multiple causal paths and levels of analysis to be investigated. Behavior, cognition, personality, and emotion can each be assessed at various levels of functioning, including physiological, overt behavioral, and subjective thought and feeling. In addition, each form of functioning may affect or be affected by a variety of interpersonal, environmental, and cultural contexts.

Capturing this complexity and diversity with scientifically valid and reliable measurements, methods, and statistical techniques is necessary to advance basic behavioral science. Currently, there are no specific ways to support method development and validation in behavioral science. Consequently, much method development occurs on the fly during pilot phases of research, while method validation and statistical advancement often occur after the data collection.

■ **The NAMHC recommends that NIMH develop new initiatives and mechanisms of Federal support specifically aimed at strengthening the methodological underpinnings of behavioral science. This would include support of—**

- **Research focused on the development, standardization, and validation of new measurements and methods, with particular attention to their appropriateness across diverse populations.**

- **Research addressing the compatibility and uniqueness of distinct methodological approaches (e.g., experimental, epidemiological, ethnographic) as a means for improving the breadth of understanding of complex behavioral phenomena**

- **Research aimed at developing or adapting new technologies (e.g., interactive**

video) and new computer modeling and statistical techniques for assessing and analyzing complex systems of functioning.

■ **The NAMHC recommends an increase in support for NIMH research in method development. Incremental increases of $1.5 million per year (plus annual adjustments of 10 percent) would support 10 new research grants each year focused on basic behavioral science method development and validation.**

## 7. Establish Multimedia Data Base Archives for Basic Behavioral Science

Continuing advances in information technology offer unprecedented opportunities for preserving, retrieving, and analyzing scientific data, including those from large-scale surveys and longitudinal studies. In addition, they provide increasingly sophisticated techniques for acquiring data, including high-resolution audiovisual recordings of overt behavior, integrated graphic displays of physiological processes, and visual images of brain activity. Together, these technological accomplishments allow behavioral scientists to collect and manage more detailed information, on more people, in more varied contexts, than ever before.

Collection of technologically sophisticated data, however, is quite costly in both scientific effort and financial investment. Also, the sheer volume and complexity of questions that can be addressed by such data are frequently beyond the scope of any one investigator. Managing these costs and improving scientific productivity could be greatly facilitated by creating data base archives that are electronically accessible to the wider behavioral science community. For example, the data archive based on the National Survey of Children and Youth has been a rich resource to many investigators, who in turn have made significant contributions to the field of family research. Given that this archive only involves data from individual interviews, even greater contributions can be expected from archives based on sophisticated multimedia data sources. The expected benefits include—

- Maximizing the cost-efficiency of behavioral science research data by reducing the need to re-collect similar data.

- Optimizing the scientific productivity of behavioral data bases by encouraging the scientific community to explore fully the array of questions testable within and across existing data sets.

- Facilitating scientific collaboration within and across disciplines by sharing common data sets.

Creating and maintaining these archives will require the development of a new mechanism of Federal support as well as new review criteria to ensure that the highest standards of scientific quality and integrity are applied in the acceptance, management, and dissemination of data archives.

■ **The NAMHC recommends the establishment of data archives for behavioral science to preserve electronically and make accessible detailed data collected during behavioral science research projects—especially those supported by NIMH. An initial increase of $1 million (plus subsequent annual adjustments of 10 percent) would permit the examination and piloting of options and the development and implementation of the most effective technologies and procedures. NIMH should pursue this initiative with other interested NIH Institutes**

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and with other Agencies that share an interest in these data bases.

## 8. Facilitate the Support and Conduct of Longitudinal Research

Increasingly, a lifespan perspective has been advocated in research on individual development and adaptation and on family and interpersonal relationships. Specific research issues raised in this document that demand a longitudinal design include exploring the contribution of emotional traits to behavioral disorder from infancy through adolescence; investigating the developmental pathways leading to the establishment and maintenance of self-esteem; describing the aging-related changes in perception, attention, and memory; examining the early formation of social standards and stereotypes; and differentiating the development of health-promoting versus stress-exacerbating aspects of parent-child relations. However, such longitudinal research requires continuity in funding, and some long-term longitudinal studies have been hampered by the current 5-year limit of support available through traditional research grant mechanisms.

■ **The NAMHC recommends that NIMH determine whether longitudinal research is appropriately and adequately supported using current grant mechanisms and current peer-review procedures.**

A specific research initiative requiring long-term grant support would be a National Study of Vulnerability and Resilience in Mental Health—a comprehensive, prospective, and nationally representative longitudinal study of normal behavior of infants, children, and adolescents. Through long-term study (from before birth to young adulthood) of subject populations that are diverse in ethnicity and socioeconomic status, this initiative would provide a valuable window into how children's evolving cognitive, emotional, and social capacities are related to mental health and illness in childhood, adolescence, and adulthood. Research described in this report has repeatedly demonstrated the complexity of personal and contextual factors in adaptation. No study to date has examined normal development with such representativeness and breadth.

Such a study would complement the more focused and applied ongoing NIMH Cooperative Agreement for a Multisite Study of Mental Health Service Use, Needs, Outcomes, and Costs in Child and Adolescent Populations. It would (1) attend to developmental change in children's vulnerability as well as in competence, (2) emphasize the continuum of maladaptive and adaptive behaviors and how they develop over time, and (3) view mental health and illness as the integration of behavioral and biological components in familial, community, and cultural contexts.

## Conclusion

These recommendations summarize actions necessary to strengthen basic behavioral science research and to pursue the many outstanding research opportunities in basic behavioral science. The funding levels included in the recommendations reflect the best professional estimates of the resources necessary to pursue this research agenda.

This report and its recommendations do not address the vital research opportunities involving the application of behavioral science to clinical problems, nor do they take into consideration the highly meritorious research opportunities available in other research areas supported by NIMH, including basic molecular and behavioral neuroscience; genetics; epidemiology; preventive

interventions; pathophysiology and treatment of specific mental illnesses of children, adults, and the aging; and mental health services research. These research opportunities are described in other reports by the NAMHC over the past decade. The NAMHC recommends these increases in the funding of basic behavioral science research as part of a more general societal investment in research related to mental illnesses, which take a heavy financial and emotional toll on our fellow Americans each year.

# APPENDIX A

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## APPENDIX B

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# APPENDIX C

# EXECUTIVE SUMMARY

To improve our Nation's mental health, the National Institute of Mental Health (NIMH) supports a wide range of research related to the etiology, diagnosis, treatment, and prevention of mental disorders. The Institute's advisory body, the National Advisory Mental Health Council (NAMHC) periodically surveys needs and opportunities in specific research areas relevant to the NIMH mission. In the recent past, NAMHC reviews have mobilized NIMH resources to develop promising research initiatives in schizophrenia, in mental disorders of childhood and adolescence, in basic neuroscience, and in research on services for people with severe mental illness. In a similar vein, the report summarized here is expected to provide guidance for the Institute's basic research programs concerning behavioral and social factors that promote mental health or contribute to mental disorders. It offers an overview of progress and promising lines of basic behavioral science[1] research, and highlights aspects of that research requiring the Institute's special attention and stimulation.

It is important to note that NIMH encourages and supports a far broader range of behavioral science research topics than those described here. This report focuses on basic behavioral science research within the existing scope of NIMH's Division of Neuroscience and Behavioral Science. It is directed particularly to research that addresses psychological and social factors affecting the normal behavior of the whole person (or organism) rather than physiological subsystems.

To conduct the extensive review process leading to the report, the NAMHC appointed a Steering Committee consisting of two behavioral scientists (Drs. Gordon Bower and John Kihlstrom) and four Council members (Drs. Jeanne Fox, James Jackson, Joseph Matarazzo, and James McGaugh). The Steering Committee enlisted the help of 12 other experts in behavioral science to serve on the ad hoc NIMH Basic Behavioral Science Task Force, which was convened especially for this review. The Task Force was directed to identify priority research areas with high potential for advancing basic knowledge that can aid in understanding, treating, and preventing mental and behavioral disorders.

Following initial planning sessions, the Task Force divided its work among six topic-based subcommittees. The subcommittee members wrote and exchanged concept papers in their specialties and met as a group to discuss the merits and priorities of various lines of research. The Steering Committee selected only some of the many significant lines of current research in each major area to include in the report. However, this sam-

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[1] Throughout the report, the term "basic behavioral science" includes a wide range of topics in psycholoogy and related sciences (e.g., linguistics, ethology) as well as research domains often described as social science, such as sociology and cultural anthropology.

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ple is expected to convey the nature of the important scientific questions currently under investigation, along with some interesting and relevant findings and challenges for future research.

# The Problem Today

According to current estimates, more than one-fifth of all adults in the United States suffer from mental disorders in any given year. For most of these people, the disorders are relatively mild and brief. But about 5 million adult Americans—2.8 percent of the adult population and possibly a similar proportion of children and adolescents—suffer from severe mental illnesses such as schizophrenia, bipolar and unipolar affective disorder, schizoaffective disorder, autism, panic disorder, and obsessive-compulsive disorder.

In 1990, mental disorders of all types cost the Nation an estimated $148 billion. This figure includes treatment costs of $67 billion—10 percent of the total annual direct cost of health care in the United States. It includes, as well, the social costs of these illnesses, which collectively reduce life expectancy, lessen productivity, and increase demands on both the social service and criminal justice systems.

Economic data alone cannot begin to account for the enormous suffering borne by people with mental disorders and their families. Their pain is exacerbated by the societywide misunderstanding, fear, and stigmatization that still afflict people with these disorders and often limit their access to the social supports, services, and resources that can help them.

## Progress and Prospects

Since its founding nearly 50 years ago as part of the nascent National Institutes of Health

(NIH), NIMH has had a deep and productive commitment to basic research in behavioral science. Over the ensuing decades, these commitments have produced enormous benefits, changing how we understand ourselves and others, how we raise and educate our children, and how we manage our social relations with one another. Of particular significance to millions of Americans with mental illness and their families, basic research has made important contributions to the prevention, diagnosis, and treatment of mental disorders.

Treatment approaches derived from basic behavioral science research are now commonly used in many clinical settings. For example, basic studies on conditioning and learning have laid the foundation for a widely used group of treatments known collectively as "behavior therapy," which have been effective for combating depression, anxiety disorders, eating disorders, and alcohol abuse. Basic behavioral science research also has had other successful clinical applications, such as improved methods of marriage and family counseling, improved validity and reliability of mental disorder diagnostic categories, and more persuasive techniques of health education and health promotion.

Looking ahead to the 21st century and beyond, opportunities abound for further significant advances in knowledge and clinical care through basic behavioral science research. This domain of inquiry is enormous; it ranges from how nature and nurture interact to affect memory and personality to how culture affects the recognition, expression, and course of mental disorders.

Thus, this summary, like the report it attempts to encapsulate, can only hint at the promising basic behavioral science research opportunities and needs before us. It illustrates the direction and pace of progress, points to new paths of scientific investigation

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and promise, and recommends ways to strengthen the research enterprise. Readers are urged to consult the full report for a more extensive discussion of the knowledge and needs that give rise to the following opportunities and recommendations.

# Basic Behavioral Science Research Opportunities

## Emotion and Motivation

Advances in the study of emotion now permit researchers to identify fundamental emotions and how they develop and to examine their role in individual and group behavior. Using new measurement techniques, researchers can "read" and study subtle facial expressions and emotional states that are not normally perceptible. These and other developments are helping to specify the linkages between diverse types of normal and abnormal emotional experience, such as depressed mood, and specific patterns of brain activity. Research is also clarifying the special adaptive and maladaptive roles of negative emotions, such as anger, fear, sadness, and disgust.

Studies of motivation in animals are providing a more precise understanding of both the biological and social regulation of eating, mating, sleeping, and other life-supporting activities often disrupted in humans with mental disorders. For example, rats, like humans, overeat more in groups than when alone, and chimpanzee dietary habits, such as food-getting skills and tool use, are culturally transmitted.

Researchers are also shedding new light on the key role of language, abstract thought, and other symbolic activities in shaping human motivation and behavior. They are specifying the emotional effects of having diverse types of short-term and long-term

goals, sharpening our understanding of achievement motivation, spelling out the particular benefits of intrinsic motivation for performance, and bringing new understanding to an essential component for effective treatment and prevention: motivation for behavior change.

These advances raise further questions for future research:

- What connections link the subjective, expressive, and physiological components of emotional and temperamental traits that play a role in behavioral disorders of childhood?

- What are the continuities across and distinctions among emotion (both positive and negative), mood, and emotional traits?

- What are the patterns of emergence of children's coping strategies for controlling their emotions and thereby their social relationships?

- How are patterns of emotional communication related to the development, maintenance, and erosion of emotional bonds and empathy between caregiver and infant, between peers, and between romantic partners?

- How do motivated behaviors, such as sleeping, eating, drinking, and mating, arise from the interaction of the external environment with physiological factors such as hormones and neurotransmitters?

- What are the behavioral and biological mechanisms through which hormones and the environment interact to shape sex differences in reproductive behavior, and what are the critical timeframes for these interactions?

- What processes are involved in develop-

ing, fostering, and maintaining intrinsic motivation, and how are these processes linked through intrinsic motivation to self-esteem and psychological functioning?

Additional research issues include—

- Developing improved methods to assess the vocal, postural, gestural, and facial components of emotional expression as well as antecedent conditions, subjective emotional experience, and physiological activity.

## Vulnerability and Resilience

Research increasingly demonstrates that the hardiness of a person's self-concept depends on the interplay of both genetic predispositions and environmental experience. Personality researchers are discovering relatively stable temperamental traits and personality patterns in infants and young children that are precursors and predictors of later problem behavior and psychopathology, such as drug addiction, depression, and possibly anxiety disorders. They are also finding that some of these patterns can be changed—even in adulthood. For example, intervention studies suggest that the hostility component of "type A" behavior, which contributes to heart disease, can be altered through behavioral counseling.

Considerable research has examined the mental and physical health of "repressors"—people who characteristically and unconsciously inhibit their emotions. It consistently shows that such behavior increases cardiac reactions, impairs immune function, and contributes to various health problems. Other studies in humans and animals are examining the temperamental trait of shyness, found among 15 to 20 percent of human and monkey infants, and are clarifying how this trait is affected by the interplay of genetic and environmental factors.

Many studies confirm that the quality of early attachment between infants and their caregivers is critical to healthy emotional development. Insecure attachment can lead to difficulties in relating to other people as well as later problems in childrearing. However, researchers have also found that caregivers' sensitivity and responsiveness in interacting with infants—a key factor in early attachment security—can improve with therapy.

People's self-concepts are now recognized as differentiated, encompassing domains of life such as scholastic ability, physical appearance, and job competence. This view has opened the door to a richer perspective on self-esteem and how it develops and changes over time. For example, research is revealing that individuals differ in how much their self-esteem depends on their physical appearance. Research is also identifying the characteristics of schools that raise or lower self-esteem and academic performance.

These advances raise further questions for future research:

- Through what developmental pathways is self-esteem formed and maintained?

- What are the detailed patterns of stability and change in parent-child attachment relationships, and what is the developmental impact of early childhood attachments to grandparents, siblings, and other caregivers?

- What are the possible contributions of major life stressors, such as divorce and severe medical illness, to a child's emerging attachment security and subsequent development?

- What cultural strengths maintain a solid sense of self among ethnic minority-group members, collectively and individually?

Additional research issues include—

- Developing theory and assessment tools to understand stability and change in specific personality patterns over time.

- Enhancing self-report measures of personality traits by using judgments by reliable observers, collecting behavioral observations in natural and laboratory settings, and recording concurrent psychophysiological reactions.

## Perception, Attention, Learning, and Memory

How do fuzzy patches of light on the retina become transformed into our meaningful three-dimensional visual world? Significant advances have occurred in understanding critical aspects of perception, such as how we automatically analyze the shape of objects to recognize them quickly, from any angle. Other research on perception is revolutionizing our understanding of how we read; recent findings suggest that in performing that form-recognition task, humans resemble ultrafast computers that use parallel processing rather than serial processing. Researchers have developed many ways to assess normal and abnormal attention and are clarifying the demands of various tasks on our attentional resources. They are also illuminating the relation between attention, consciousness, and perceptual processing.

Basic research on learning has contributed to a wealth of treatment approaches for mental disorders and drug addiction. It has also provided animal models, such as "learned helplessness," that reveal some of the complex mechanisms contributing to depression and anxiety disorders. Research on how fears and phobias are acquired is clarifying how fears can be learned—or prevented—by observing the behavior of others. Research on a learning phenomenon known as "blocking" suggests that animals are quite sophisticated

in detecting and analyzing environmental cues and associating them to significant outcomes. Other research reveals that old learning is not eradicated; it simply becomes controlled by new stimuli. Identifying and controlling such stimuli may prove to be critical for regulating unwanted behavior.

The vagaries of normal memory are increasingly well documented through laboratory studies of how people reconstruct remembered events. Researchers are also delineating how emotion and mood color the events we place into memory as well as how we later recall them. By uncovering an inbuilt bias for recalling events similar in emotional tone to one's current mood, this research helps to explain some of the cognitive biases that perpetuate normal and abnormal mood states. Research also reveals several distinct forms or systems of memory. One of these, implicit or unconscious memory, has been shown to exist even when brain injury or other conditions impair conscious memory. Other memory-related research shows how thoughts one tries to suppress often return with a vengeance.

These advances raise further research questions:

- What are the characteristic adaptations and compensations of people with perceptual or motor deficits, how do they arise, and how do they vary with age?

- What specific mechanisms of attention are implicated in the causes, prevention, and treatment of particular attention-related disorders?

- What learning and decisionmaking phenomena are related to individual differences in acquiring self-control, particularly delay of gratification?

- What causes memory failures and distortions in normal individuals, and how are

these processes exacerbated in disorders such as Alzheimer's disease, Korsakoff's syndrome, and the various amnesias?

- How is negative or threatening information organized in and retrieved from memory?

- How do aging-related changes affect the speed of cognitive processing and the rate of acquiring new cognitive skills?

- What are the positive and negative effects of using advanced information technologies, such as virtual reality, on perceptual and cognitive skills and social interactions?

## Thought and Communication

Research on normal thinking and judgment reveals that most reasoning is unconscious, automatic, and rarely open to introspection. How emotion colors judgment is becoming clearer, such as the finding that during sad states, people are more likely to report health problems and be pessimistic about future health.

Although worries and other negative thoughts are very difficult to control, especially by people with anxiety and depression, new training approaches may provide more effective ways to suppress such thoughts. Studies suggest that people generally adjust their scale of satisfaction to judge their current state as moderately positive.

Advances in human information processing have greatly altered our notion of intelligence. For example, intelligence is closely related to how rapidly people can recognize significant patterns and retrieve information from long-term memory. Intelligence is also related to analogical reasoning—transferring knowledge from one situation to another. The cognitive strategies underlying this critical ability are now being identified.

The possibility of multiple types of intelligence is also under investigation.

Researchers have now developed measures of infant learning that show promising correlations with some components of intelligence 6 years later. They have also discovered unexpected capabilities in babies, such as rudimentary counting. Other research is examining the development of children's "theories" about physical causation and about other people's minds.

The discovery of universal structural principles among languages of the world—including sign languages—suggests that language arises from a specific brain system. Researchers have also uncovered a universal timetable for acquiring language, which appears to depend more on children's maturation than their length of exposure to language. Recent research is clarifying the linkage between specific aspects of language use and particular areas of the brain to aid in diagnosing brain disorders. Neural-network modeling, using data from animal and human experiments, explores in computer models how complex networks of elements similar to brain nerve cells might give rise to different aspects of language behavior.

Research questions raised by these advances include the following:

- How do distorted thought patterns, such as those seen in depression and anxiety disorders, arise from and interact with normal thought?

- How do emotions, mood, and stress influence reasoning, decisionmaking, memory, and the development and structure of cognitive biases?

- Why does thought suppression so often fail, what strategies enhance its effectiveness, and what methods can help people

overcome sustained negative thoughts and feelings?

- How does everyday reasoning operate in practical situations that require making major decisions, including choice of mate, school, career, and medical treatment?

- How do people in diverse cultural groups differ in the types of information they attend to and in their patterns of reasoning?

- How do creative and inventive types of thinking operate, and how they can be enhanced?

- What genetic and experiential factors underlie disorders of cognition, including disorders of language capacity?

Additional research issues include—

- Studying language and learning to discover principles for presenting information for the most effective comprehension and impact.

- Conducting validation studies to refine measures of cognitive function in infancy that predict later intellectual functioning.

- Testing and specifying further neural network models of cognition based on the organization of brain cells.

## Social Influence and Social Cognition

Progress in understanding how social influence and social cognition affect health and social well-being has led to studies of ways to harness these forces constructively. Research is clarifying how racial and gender stereotyping contribute to interpersonal hostility and loss of self-esteem, and how negative stereotyping can be lessened. Researchers have found that having people adopt behavior inconsistent with their attitudes can lead to attitude change, and techniques for persuading young people to resist group pressure have emerged.

Research on social cognition is not only exploring how social beliefs influence interpretations of and reactions to events, but also how events—even those outside conscious awareness—can trigger different social behaviors. Also under study are the powerful effects of how people attribute cause. For example, aggressive boys tend to expect aggression and are prone to interpret ambiguous behavior as hostile; these attributions—and related aggressive behavior—appear to change with certain types of therapy.

Research has confirmed that discrimination and stigmatization force many people to devalue their social identities. However, members of stigmatized groups can preserve their self-esteem by emphasizing other less-threatened aspects of their identity. Research is now exploring the long-range implications of such socially reactive shifts in identity as well as how more constructive strategies may counteract threats to social identity.

These advances raise further research questions:

- How do the principles learned through basic research on persuasion operate within counseling and psychotherapeutic interventions, and how can they be used to enhance those treatments?

- Through which cognitive and social mechanisms do maladaptive beliefs produce persistently biased judgments, and what social conditions promote negative or self-defeating evaluations?

- What psychological and social factors can deter or override the use of stereotypes, and how can this knowledge be applied and evaluated in real-life situations?

- Which aspects of identity are more or less vulnerable to challenge and change, and which social, cognitive, and behavioral characteristics accompany transformations in identity?

- How do social standards, stereotypes, and identity develop, and how are phases of cognitive development linked to exposure to socially evaluative messages from parents and the broader social and cultural environment?

- What factors strengthen social attitudes, and how does the family and community context contribute to the formation of these attitudes?

## Family Processes and Social Networks

Family interactions provide a vital context for mental health and illness. For example, children of parents with schizophrenia are significantly more likely to develop a severe mental disorder when raised in dysfunctional adoptive families than in healthy, supportive adoptive families. However, the reasons for this association remain unclear.

Research indicates that caregivers who are excessively controlling undermine children's persistence, competence, self-regulation, and overall ability to cope with life's problems. Children also influence and control their caregivers, and some children with difficult temperaments severely challenge their caregiver's sensitivity and disciplinary strategies.

Researchers are exploring how marriage and intimacy affect well-being and mental health and are seeking predictors of successful marriages. Heart-rate measurements made while couples discuss conflict-laden issues can forecast the likelihood of marital survival, in some cases more reliably than the spouses' reports of marital satisfaction. Research on

partners' mutual emotional support has led to advances in therapeutic techniques that can reduce marital distress and depressive symptoms.

In families in which adults consistently escalate their hostility and intensity of conflict, both parents and children are at high risk for distress and psychopathology. Across many social classes and ethnic groups, marital dissolution and childrearing outside of marriage often have long-term negative effects on children, including lowered achievement and intellectual test scores, increased school dropout, early motherhood, and antisocial behavior. New studies of mother-stepfather families have challenged the idea that stepfathers can easily replace biological fathers.

Studies show that social support protects healthy people from the negative emotional consequences of stressful life events, helps people with clinical depression maintain their treatment gains, improves recovery of physically ill people, and helps people with schizophrenia function in the community while lessening their chances of relapse. Social networks increase the flow of information, material assistance, and other resources to needy individuals. Research is exploring ways to foster social support and use it to help caregivers in their own supportive roles.

Further research questions are raised by these advances:

- What are the health-promoting versus stress-exacerbating aspects of parent-child relations across the lifespan?

- Through which specific paths and mechanisms do family stresses and disruptive family problems, such as high-intensity marital conflict or sibling aggression, lead to adjustment problems?

- Which skills and processes foster inter-

personal satisfaction and contribute to the receipt of long-term social support, and what are the most beneficial matches between types of support and individual life situations?

- What variations within and across cultures in beliefs, attitudes, and practices contribute to the formation and maintenance of satisfying intimate relationships?

- How do various family structures and changes in structures affect adjustment throughout life?

Additional research issues include—

- Determining through prospective longitudinal studies how accomplishments or problems during one phase of family life can affect mental health outcomes in later life and across generations.

- Improving the reliability and validity of family assessment measures across groups varying in cultural background and degree of risk for psychopathology.

## Sociocultural and Environmental Processes

Research is illuminating the social, cultural, and environmental forces that shape who we are and how well we function in the everyday world. For example, large cross-cultural differences in the rate of recovery from schizophrenia may stem, in part, from diverse cultural beliefs about its causes and nature. Cultural differences may also bias diagnoses of mental illness when clinicians misinterpret symptoms in people from cultures different from their own.

Studies of economically disadvantaged racial, ethnic, and cultural groups in the United States reveal that discrimination often results in chronic levels of stress that have physical effects, such as increased

blood pressure; social effects, such as racial distrust; and psychological effects, such as "disidentifying" with academic activities. Research on the conflicts and adaptive mechanisms of minority-group members consistently shows that biases operating between groups are more strongly influenced by preferences toward their own members than by negative feelings toward members of other groups. When ethnic groups increasingly focus on their own members, that behavior ultimately heightens conflict with other groups. One line of research is attempting to create new social structures with which individuals from diverse cultural groups can identify.

The highest rates of diagnosable mental disorder are found among groups with the lowest socioeconomic status. Having a mental disorder can cause people to drift into poverty, but deprivations related to poverty also appear to contribute to mental disorder. Indeed, virtually all major psychosocial risk factors for mental illness are more prevalent at lower socioeconomic levels.

Research reveals how economic hardship often severely disrupts parenting and family interactions, with adverse long-term mental health implications for children. Mothers with chronic financial problems are frequently rejecting and behave inconsistently toward their children in a manner strongly resembling mothers with clinical depression. However, positive family relationships and childrearing practices and preschool support programs can reduce or eliminate many of these adverse effects.

The widespread employment of women has few negative effects—and some beneficial ones—on the women, their spouses, and their children. Studies also reveal that the involvement of husbands in childcare and household labor can improve the mental health of working wives, and that mothers who engage in repetitive routine paid work

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are less available emotionally to their children and less able to assist their development than are other working mothers.

The nature of communities and organizations plays a more powerful role in family and individual well-being than was previously believed. Researchers are exploring how the economic decline of neighborhoods limits adults' access to jobs, social networks, and positive family role models and children's access to supervision, thus contributing to increased community disorganization and social problems. Some of these effects can be altered through close social and organizational networks. Both attachment to schools and participation in community organizations have been shown to protect at-risk youths from delinquency and antisocial behavior.

Further research questions are raised by these advances:

- How does ethnicity affect social cognition and achievement motivation, and what cultural differences exist in the expression and labeling of emotion?

- How do cultural norms affect the diagnosis and treatment of mental illness and the extent to which members of different cultures expect to provide for the "at home" nurturing of individuals with mental illness?

- How do ethnic and racial discrimination in school and work settings affect the mental health of individuals?

- How do individuals, social groups, and communities develop successful strategies for dealing with disempowering situations?

- How is the mental health of immigrants influenced by such factors as acculturation, socioeconomic status, the presence or absence of an accessible ethnic community, the ethnic composition of schools, and support systems in the work environment?

- What processes mediate and moderate the effects of socioeconomic status on mental health, including work experience, availability of health care and other supports, and variation across social and ethnic groups?

- How is the well-being of parents and children affected by such factors as the nature of work environments, spouses' supportiveness for one another's work demands and aspirations, and varying kinds of family constellations?

- What key aspects of communities threaten or protect mental health and well-being, including the supportive role of social networks and challenges created by instability in educational, occupational, and residential environments?

## Recommendations

To assure the continuing contributions of NIMH-funded basic behavioral science research to the growth of knowledge and its application to improved mental health, the National Advisory Mental Health Council makes the following essential recommendations.

■ **Increase support for investigator-initiated research.**

■ **Increase support for research training.**

■ **Preserve expert review of basic behavioral science.**

■ Encourage basic/clinical research collaborations.

■ Strengthen the methodologies of basic behavioral science research.

■ Preserve and expand facilities for

research on behavioral and social processes in animals.

■ Establish multimedia data base archives for basic behavioral science.

■ Facilitate the support and conduct of longitudinal research.