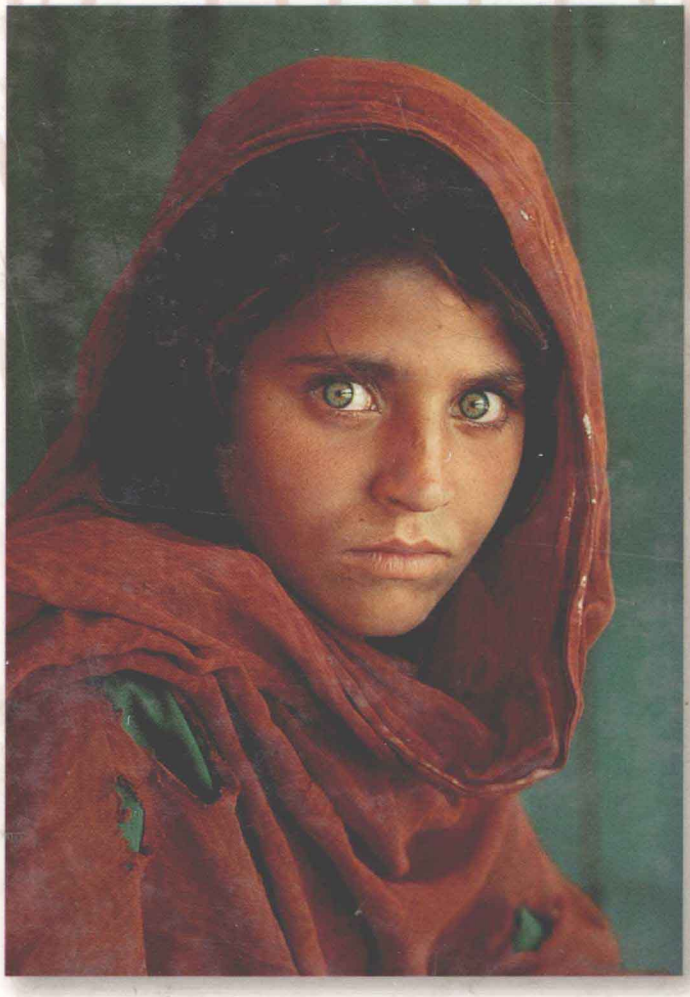
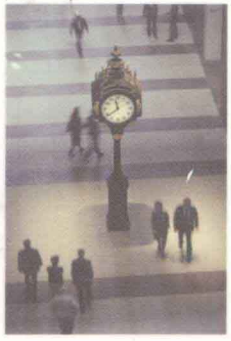
PSYCHOLOGY

Frontiers and Applications





Michael W. Passer ▼ Ronald E. Smith

PSYCHOLOGY

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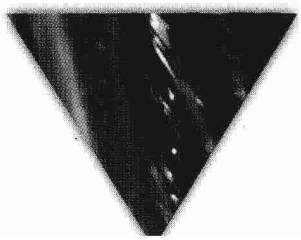

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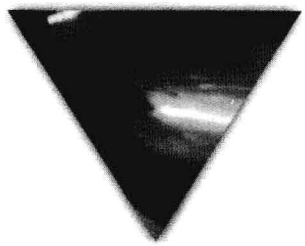


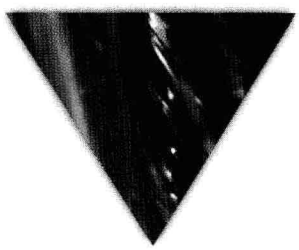
Michael W. Passer, Ph.D.

Michael W. Passer coordinates the introductory psychology program at the University of Washington, which enrolls more than 3,000 students per year. He received his bachelor's degree from the University of Rochester, his Ph.D. in Social Psychology from the University of California, Los Angeles, and has been a faculty member at the University of Washington since 1977. A former Danforth Foundation Fellow and University of Washington Distinguished Teaching Award finalist, Dr. Passer has had a career-long love of teaching. He teaches introductory psychology twice yearly and has also taught courses in research methods, social psychology, industrial-organizational psychology, and attribution theory. Dr. Passer developed and annually offers a graduate course on Teaching of Psychology, which prepares students for careers in the college classroom. He has published over twenty scientific articles and chapters, primarily in the areas of attribution, stress, and anxiety.

Ronald E. Smith, Ph.D.

Ronald E. Smith is Professor of Psychology at the University of Washington, where he has served as Director of Clinical Psychology Training and as Head of the Social Psychology and Personality area. He received his bachelor's degree from Marquette University and his Ph.D. from Southern Illinois University, where he had dual specializations in physiological and clinical psychology. His major research interests are in personality, anxiety, stress and coping, and in performance enhancement research and intervention.

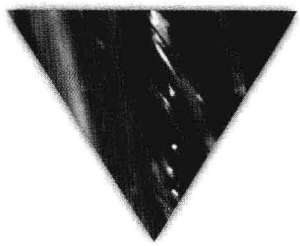
Dr. Smith is a Fellow of the American Psychological Association. He received a Distinguished Alumnus Award from the UCLA Neuropsychiatric Institute, where he did advanced clinical training, for his contributions to the field of psychology. He has published more than one hundred scientific articles and book chapters in his areas of interest and has authored or coauthored nineteen books on introductory psychology, stress and stress management, and human performance enhancement. An award-winning teacher, he has more than fifteen years of experience in teaching the introductory psychology course.



In memory of my parents, Jerome and Nathalie,
in gratitude to my mentors, Harold Kelley and
Harold Sigall, and to my wife, Bev, for everything.
mwp

To Kay, in gratitude for her loving
encouragement and support.
res

PREFACE



This textbook reflects our experiences as undergraduate students and later as faculty who have taught the introductory psychology course many times (25 years and approximately 50 course offerings between us). As undergraduates, neither of us planned to become a psychologist. Mike planned to major in physics or chemistry, and Ron was a journalism major with a minor in philosophy. But the introductory psychology courses prompted both of us to change our majors to psychology. Because of instructors who brought psychology to life, we left our introductory courses with four goals that have remained with us ever since:

- To teach students that the world of behavior is downright fascinating;
- To help students think critically and analytically about behavior, and to dispel commonly held myths;
- To show how behavior can be studied with intellectually exciting scientific rigor.
- To bring the basic and applied aspects of psychology to life by applying scientific principles to real-world problems;

Years later, these themes remain our guideposts when we teach introductory psychology. As instructors, we want to pass on the torch of excitement about studying behavior that we received as undergraduates, and that we have experienced as scientists. To achieve this goal, we present the field from a perspective that emphasizes the interplay between basic science and applied science. Our goal is to bring both aspects of psychological science to life for our students. We strive to foster analytical thinking that teaches students how to view the world of behavior in a more sophisticated fashion, as most psychologists do. This approach has been well received by our students over the years.

Before describing how our book captures these themes, let's address one other key issue. In exit polls of graduating psychology majors at our university, most students report that the introductory psychology course was the most important stimulus for their deciding to major in psychology. Indeed, it is always gratifying to run into psychology majors who tell us that we helped shape their academic careers. But also important are the greater number of students who will not major in psychology or even take another psychology course. The introductory course is our one opportunity to inform and excite these students about psychological science and its contributions to their lives and to society.

› THEMES AND FEATURES OF THE TEXT

To provide a more cohesive approach to psychology, we have created a simple thematic framework that is integrated throughout the book. This framework is enhanced by our book's emphasis on the science of psychology and coverage that explicitly links basic and applied psychology.

Promoting Analytic Thinking: A Simple Framework That You Will Remember

"[One strength is] the use of themes that are carried throughout the book that emphasize basic concepts about psychology and behavior. These help to provide a more unified perspective on psychology. The chapters do not seem as disconnected as they often do in other books."

—Robert Kaleta, University of Wisconsin–Milwaukee

When teaching introductory psychology, we seek to enhance students' ability to think analytically about behavior, as psychologists do. To help students become more sophisticated in their everyday understanding of behavior, we present a simple framework that emphasizes the multicausal nature of psychology: *The causes of behavior can be studied at biological, psychological, and environmental levels of analysis.*

Our text establishes this theme in Chapter 1, where we describe the history of psychology in relation to the biological, cognitive, behavioral, psychodynamic, humanistic, and sociocultural perspectives that guide contemporary thinking in our field. We show how these perspectives contribute to the multilevel analysis of causal factors, and carry this unifying theme throughout the book in textual discussion and in special graphic features. These figures, entitled ***Understanding the Causes of Behavior,*** summarize the biological, psychological, and environmental causes discussed for specific topics. This levels-of-analysis framework is selectively applied within each chapter to achieve a unifying consistency without being overly repetitious.

Treating Cultural and Gender Issues

Cultural and gender issues are at the forefront of contemporary psychology, and it is crucial for any introductory textbook in psychology to nourish analytical thinking about these issues. Rather than isolating this material within one chapter, we have emphasized and integrated it throughout the text. Our multicausal levels of analysis approach represents culture at two levels: as an environmental factor and as a psychological factor that reflects the internalization of cultural influences. Cultural and gender issues are highlighted in several of the in-depth special features found throughout the book, spanning such diverse topics as pain, visual perception, psychopathology, self-concept, sexuality, cognitive skills, love and marriage, and coping strategies.

The textbook fosters analytic thinking in other ways. Without being overly repetitious, we return periodically to important themes, such as the inability to draw causal conclusions from correlational results. A special research feature within each chapter not only describes the methods and results of a specific study, but also critically evaluates it. Critical thinking questions at various places in the text also promote active learning. Finally, at the end of each chapter, a feature called ***Applying Your Knowledge*** consists of a set of ten multiple-choice questions that require students to analyze scenarios in light of what they have learned in the chapter.

Fostering an Understanding of Scientific Principles and Methods

"I find the style completely engaging – fresh, exciting illustrations of principles without oversimplification or "talking down" to the students. . . . The non-psych majors . . . will find it interesting and readable. . . . The psychology majors, who find some of the less challenging textbooks too simple, are also likely to be excited by the fascinating applications of concepts in the context of good scientific explanations of terms and processes."

– Kathleen Malley-Morrison
Boston University

Throughout the book, we emphasize the science of psychology. Psychological science is fascinating not only because of the rich insights it provides about human and animal behavior, but also because of its dynamic, evolving nature. To highlight this evolving feature of our science, each chapter includes an in-depth feature called **Psychological Frontiers** that presents cutting-edge scientific discoveries such as *Virtual Reality as a Therapeutic Technique* (Chapter 15).

Students need to know not only the findings derived from research, but also how the research is done. We live in an era in which students are bombarded with scientific information and misinformation. Therefore we have devoted special attention to Chapter 2, "Studying Behavior Scientifically." There are two keys to a successful and engaging methods chapter: clear explanations and lively examples of scientific concepts and methods drawn from actual research. The chapter includes an exercise designed to help students experience the pitfalls of hindsight bias, a feature on paranormal phenomena that highlights the importance of not accepting conclusions at face value, and critical thinking exercises in which students are challenged to detect flaws in scientific reports or the popular press.

In addition to our research chapter, every chapter includes a special feature called ***Research Close-Up*** that presents a classic or recent study in journal format (background, method, results, and critical analysis). Together, these features provide a window to the researcher's world, an understanding of empirical methods, and an opportunity to think critically about research findings.

We also strive to emphasize the constantly evolving nature of psychological research. New findings appear monthly in hundreds of scientific journals around the world. Keeping up with the stream (or more accurately the torrent) of new studies is a special challenge for textbook authors. To provide an accurate portrait of our discipline, we have made every attempt to be as current as possible. As a result of our commitment to authoritative up-to-date coverage, nearly a quarter of the book's citations are post-1998, with more than 200 references from the year 2000. Yet our effort has not occurred at the expense of classic studies. Whenever possible, we try to include both a classic and a later study in our citations.

Emphasizing Relations Between Basic and Applied Science

"The authors . . . do a masterful job of demonstrating that psychology involves basic science but that it can be applied to real-life problems. The "capstone" chapter will be particularly valuable in terms of pulling these pieces together one more time."

– J. T. Ptacek
Bucknell University

Relations between basic and applied science are emphasized throughout the text. Students who read our book will understand that many questions studied from a basic science perspective are inspired by real-world questions and issues. They also will see that basic research findings often have implications for solving social and individual problems. When such applications occur, their effects should be evaluated empirically.

We emphasize scientific applications in three ways. First, numerous examples are woven throughout the main text. Second, a special feature called ***Applications of Psychological Science,*** presented in each chapter, demonstrates in greater depth how basic research principles can be applied directly to a social problem or to the student's own life. Finally, this basic/applied theme is reinforced once again in a capstone chapter, *Psychology and*

Society: From Basic Research to Social Application (Chapter 16). In this chapter, we link psychological principles and research findings discussed in previous chapters to successful social interventions in critical areas such as health promotion, violence reduction, early childhood intervention, and reduction of multicultural conflict. We want students to leave their introductory course with a solid appreciation for what psychology has to offer society and with an understanding of how challenging it is to design, implement, and evaluate social interventions. We were gratified when one reviewer of this chapter wrote, "It just may remind students of why they took the course in the first place."

OUR PEDAGOGICAL FRAMEWORK

A textbook is, first and foremost, a learning tool. Consistent with our emphasis on the use of scientific data for applied purposes, within the book we have incorporated pedagogical tools that have an empirical basis. One important example is what we call ***directed questions,*** which occur in the margin of the book adjacent to important concepts and facts. These are designed to function as study guides and retrieval cues. Their inclusion was inspired by educational research on the value of "adjunct questions" in learning and retaining factual and conceptual material. In one major review, Richard Hamilton (1985) reviewed thirty-five experimental studies comparing the use of adjunct questions with control conditions in which participants simply read textual material. He found that questions like ours enhanced retention of facts and concepts by about 20 percent. This approach has proven so successful with our own students that we chose to make it an integral learning tool in this text.

An in-depth *Applications of Psychological Science* feature in Chapter 1 informs students about the scientific basis for the directed questions feature and instructs them in how to apply this tool in their studies. Instructors can also use the questions as a focus for homework assignments, as a study guide, and as a basis for test questions. Our directed questions should not be confused with the broader questions used in the SQ3R approach; ours are more numerous and specific. If students can answer all of them, they will have achieved a high level of content mastery and should perform very well on tests. Instructors may choose to supplement these questions with their own, or encourage their students to do so.

Four other ***Applications*** features throughout the book impart skills that can enhance student learning and course performance: behavioral self-regulation (Chapter 6); memory enhancement (Chapter 7); systematic goal setting (Chapter 13); and stress management (Chapter 10).

There are a number of pedagogical features throughout each chapter that contribute to student mastery of the content:

- Chapter Outline—this feature appears on the opening spread of every chapter to outline the major topics covered in each chapter
- Vignette—this feature opens each chapter with an interesting story provided to immediately draw students into each phychological topic
- Understanding the Causes of Behavior schema—three levels of analysis are presented in these figures to aid students understanding of the various causes of behavior in psychology
- Psychological Frontiers—this boxed feature presents students with cutting-edge scientific discoveries that will help students understand why psychology is so fascinating
- Applications of Psychological Science—this boxed feature explains how basic research principles can be applied directly to social problems and to student's own lives
- Research Close-Up—this boxed feature includes a classical or recent psychological study that is presented in a student-friendly, journal format to help students better understand the research process
- Chapter Summaries—presented in an easy-to-read bulleted format, this feature appears at the end of each chapter, facilitating student review of the content
- Key terms and concepts—this end-of-the-chapter feature presents students with a list of key words with page references that were highlighted throughout the chapter
- Applying Your Knowledge—this 10 question multiple choice quiz allows students to immediately test their comprehension of the material
- Directed Questions—these questions appear in the margins throughout each chapter are designed to act as retrieval cues to enhance student learning of psychology

ACKNOWLEDGEMENTS/ REVIEWERS

A project having the scope of an introductory psychology text is truly a team enterprise, and we have been the lucky recipients of a great team effort. We wish to thank and acknowledge the contributions of the many people who made this book possible. Jane Vaicunas, Editorial Director, convinced us (quite correctly) that McGraw-Hill was a perfect match for us as a publisher. We thank her for her faith in this project. Shortly afterward, Joe Terry became our sponsoring editor and guided the project for the next two

years. We express our gratitude to Joe for his wisdom and support. Mindy DePalma and Nancy Crochiere, our developmental editors, were wonderful to work with, and they helped keep the project on course through several rounds of reviews. On the production end, special thanks go to our Project Manager, Mary Lee Harms, for her cheerful and skillful coordination of the numerous production details. Her flexibility and wisdom was a constant source of support. Stuart Paterson guided the design and is largely responsible for the attractive appearance of the book. Bea Sussman did a wonderful job as copy editor, and photo editor Toni Morris worked tirelessly and with great tenacity. You will find many excellent and unique photos in this book, thanks to Toni's efforts. On our end of the production pipeline, we express a special debt of gratitude to Geraldine Williams, who helped us with the seemingly endless faxes and mailings during the course of the project.

In today's market, quality ancillaries are a critical element in the success of any text. Barbara Santoro, Editoral Coordinator, did a wonderful job coordinating the development of our supplementary materials, and she compiled an exceptional team. We thank Don Christensen (University of Washington), Kathleen Malley-Morrison (Boston University), and David Jones (Westminster College) for developing supplements that are second to none in quality.

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SUPPLEMENTS FOR THE INSTRUCTOR

Print

Instructor's Manual. A rich collection of lecture leads, learning objectives, in-class demonstrations, case studies, critical thinking questions, and current controversies will make course preparation a snap. This manual also provides many activity suggestions as well as handout and overhead transparency masters that will be sure to engage students' interest in class material.

Test Bank and Computerized Test Bank. Keyed to the chapter learning objectives and marginal directed questions, the Test Bank contains approximately 250 questions per chapter to give maximum flexibility. Each chapter contains roughly 175 multiple-choice, 20 fill-in-the-blank, 20 matching, 20 true/false, and 5 essay questions. The printed TB is also available electronically in MAC and Windows to allow instructors to create their own tests.

Multimedia

On-Line Learning Center for Instructors. This online resource contains PowerPoint lectures, the entire Instructor's Manual, an Image Bank, Web links, and a host of additional current resources to www.mhhe.com/passer to help prepare course materials.

Instructor's Resource CD-ROM. This CD-ROM contains PowerPoint presentations, an Image Bank, Test Bank, and Instructor's Manual in addition to an easy-to-use interface for the design and delivery of multimedia classroom presentations.

Videos. McGraw-Hill is committed to providing the video resources needed to supplement the introductory psychology course. Ask your sales representative for a brochure of current offerings and availability.

Transparency Acetates. Over 50 key images drawn from the textbook are available for the instructor. In addition, the *Introductory Psychology Transparency Set* provides over 100 additional transparencies illustrating key concepts in general psychology.

Image Gallery. This feature, located on the book's Online Learning Center, consists of outstanding graphics that can be used for presentations in the classroom. The images can be downloaded into your favorite presentation program—for instance, PowerPoint.

PowerPoint Lecture. Available on the Internet, these presentations cover the key points of the chapter and include images where relevant. They can be used as is or modified to meet your personal needs. Visit www.mhhe.com/passer

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SUPPLEMENTS FOR THE STUDENT

Print

Student Study Guide. Keyed to the directed questions in the text margin, the Study Guide contains helpful diagrams, a chapter overview and outline, key words and key people matching exercises, a chance to apply concepts, and practice chapter tests. In addition, the Study Guide includes a practice midterm and final! This is the perfect supplement for students *who are motivated to succeed.*

Multimedia

On-Line Learning Center for Students. This rich collection of electronic resources features an interactive quizzing center, learning objectives, crossword puzzles, interactive exercises and drag-and-drop graphics. In ation, the OLC offers a statistics primer, Psychology Careers Appendix, and a study skills primer at www.mhhe.com/passer.

Making the Grade Student CD-ROM. Packaged free with each copy of the text, this CD-ROM is designed to help students perform at their best. It contains practice quizzes for each text chapter, a learning styles assessment, study skills primer, guide to electronic research, and a link to the text website.

PRISM CD-ROM. This student CD-ROM contains over 60 interactive exercises and activities, chapter outlined guided reviews, web links, a Psychology Careers Appendix, practice quizzes, Psychology Around the Globe interactive articles, and an Internet Primer. A great way to make studying a more effective exercise.

Psych On-Line. This is designed to help students get the most out of the Internet for psychology research and provides general resource locations. Psychology sites are grouped by topic with a brief explanation of each site. Included are a number of genreal resouce sites for students seeking help.

Directed Questions

Each chapter has an average of forty to fifty directed questions that enhance student concept mastery, serve as retrieval clues during review, and act as a performance feedback measure for students.

Understanding the Causes of Behavior

This graphic feature occurs once in every chapter and accomplishes two important goals. First, it reinforces the central theme that behavior can be studied at biological, psychological, and environmental levels of analysis. Second, it summarizes the text's discussion of causal factors pertaining to a specific phenomenon, such as immune system functioning, learning, stress, aggression, and drug responses.

➤ 38. Which causal factors in depression are seen at the environmental level of analysis?

➤ 39. What is meant by the interaction of causal factors?

been subjected to severe loss and neglect may develop pessimistic personalities that predispose them to slide into depression in the face of later life stresses.

Finally, the environmental level of analysis reveals several factors that play a major role in depression. According to the behavioral view, depression is a reaction to a nonrewarding environment. A vicious cycle begins when the environment provides fewer rewards for the person. As depression intensifies, such people feel so badly that they to stop doing the things that ordinarily give them pleasure, a pattern that decreases environmental rewards still further. To make things worse, depressed people complain a good deal, seek excessive reassurance and support from others, and generally become less likeable. These behaviors eventually begin to alienate others and cause them to shy away from the depressed person. The net result is a worsening environment with fewer rewards, a reduction in support from others, and the unhappiness and hopeless pessimism that characterize chronic depression (Lewinsohn et al., 1985; Nezlek et al., 2000).

The sociocultural environment also affects depression. Although depression is found in virtually all cultures, both its symptom pattern and its causes may reflect cultural differences. For example, feelings of guilt and personal inadequacy seem to predominate in North American and western European countries, whereas bodily symptoms of fatigue, loss of appetite, and sleep difficulties are more often reported in Latin, Chinese, and African cultures (Brislin, 1993; Lopez & Guarnaccia, 2000). Cross-cultural studies have also shown that in developed countries like the United States, Canada, and other Western nations, women are about twice as likely as men to report feeling depressed, whereas no such sex difference is found in developing countries (Culbertson, 1997; Nolen-Hoeksema, 1990). Why should this be? At present, we do not have the answer, but we must wonder what it is about more technologically advanced cultures that would produce a sex difference that does not show up in developing countries.

Figure 1.23 summarizes causal factors in depression that are supported by theory and research. Although these causal factors are organized into three classes (biological, psychological, and environmental), we should keep two important points in mind. First, the specific causes of depression can not only differ from case to case, but they can also combine or *interact* with one another in ways that vary according to the person and the situation. **Interaction** means that the presence or strength of one factor can influence the effects of other factors. For example, a person who has a strong biological predisposition for depression may become de-

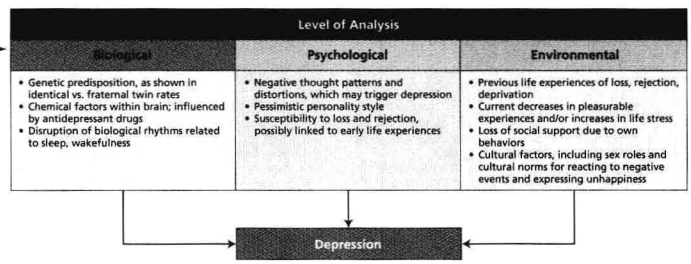

FIGURE 1.23 Understanding the Causes of Behavior: Biological, psychological, and environmental factors in depression.

Psychological Frontiers

This in-depth feature highlights cutting-edge research and issues in psychology. It emphasizes basic research and its relevance to societal applications. This feature illustrates the dynamic nature of psychological science and ways in which it can promote human betterment.

PSYCHOLOGICAL FRONTIERS

Cultural and Psychological Influences on Pain

Our interpretation of pain impulses sent to the brain depends in part on our experiences and beliefs, and both of these factors are influenced by the culture in which we develop (Rollman, 1998). Consider childbirth, for example. This event is a painful ordeal for many mothers in Western cultures, and many women express considerable anxiety about going through it (Blechman & Brownell, 1998). Yet in certain cultures women show virtually no distress during childbirth. Indeed, in one culture studied by anthropologists, it was customary for the woman's husband to get into bed and groan as if he were in great pain, while the woman calmly gave birth to the child. The husband stayed in bed with the baby to recover from his terrible ordeal while the mother returned to work in the fields almost immediately (Kroeber, 1948).

In certain parts of India, people practice an unusual hook-hanging ritual. A holy person is chosen to bless the children and crops in a number of neighboring villages. Large steel hooks attached by ropes to the top of a special ceremonial cart are then shoved under the skin and muscles on each side of his back, and he travels on the cart from village to village. At the climax of a ceremony in each village, the celebrant leaps from the cart and swings free, hanging only by the hooks embedded in his back (Figure 4.49). Incredibly, though impaled on the hooks with his entire body weight, the celebrant shows no evidence of pain during the ritual; on the contrary, he appears to be in a state of ecstasy. When the hooks are removed, the wounds heal rapidly and are scarcely visible within two weeks (Kosambi, 1967).

Although ethnic groups do not appear to differ in their ability to discriminate among pain stimuli, members of different cultural groups may differ greatly in their interpretation of pain and the amount of suffering they experience (Rollman, 1998; Zatzick & Dimsdale, 1990). In the Indian hook-hanging ceremony, for example, the religious meanings attached to the act seem to transform the interpretations and meaning of the sensory input from the hooks as well. The role of cultural factors in pain is found even within modern Western subcultures. In a study done in the Worcester, Massachusetts, area, researchers studied pain perception in 372 medical patients who represented six different ethnic groups: Old Americans (at least third-generation U.S.-born Caucasians who identified with no ethnic group except Americans), Hispanics, Italians, Irish, French Canadians, and Polish. All of the patients suffered from chronic pain conditions that had persisted for at least three months and were beyond the point of healing. The patients completed self-report measures about their pain experiences.

The ethnic groups did not differ overall in type of physical affliction, how long they had had it, or the kinds

FIGURE 4.49 A hook-swinging ceremony practiced in remote villages in India illustrates the importance of the meaning attributed to pain stimuli. After blessing all the children and farm fields in a village, the celebrant leaps from the cart and hangs suspended by the hooks in a state of ecstasy, showing no sign of pain.
Adapted from Kosambi, 1967.

of treatments and medications they were receiving. They did differ, however, in the pain levels they reported, and these differences were associated with different attitudes and beliefs about their pain. The Hispanic and Italian patients believed most strongly that they had no control over their pain, reported feeling worried and angry about it, and believed that they would be unhappy as long as they experienced it. They also believed that it is appropriate to express one's pain openly. These two ethnic groups reported the highest levels of pain and suffering. In contrast, the Old American and Polish patients felt it best to suppress the outward expression of pain, reported feeling less upset about their pain sensations, and believed that they had greater personal control over their lives. These attitudinal differences were associated with much lower levels of reported suffering (Bates et al., 1993).

Differences exist not only between cultural groups but also within them, as the physician Henry Beecher (1959) observed while working at Anzio Beachhead in World War II and later at Massachusetts General Hospital. Beecher found that only about 25 percent of the severely wounded

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RESEARCH CLOSE-UP

Stalking a Deadly Illusion

Background

When the Boeing Company introduced the 727 jet airliner in the mid-1960s, it was the latest word in aviation technology. The plane performed well in test flights, but four fatal crashes soon after it was placed in service raised fears that there might be some fatal flaw in its design.

The first accident occurred as a 727 made its approach to Chicago over Lake Michigan on a clear night. The plane plunged into the lake 19 miles offshore. About a month later, another 727 glided in over the Ohio River to land in Cincinnati. Unaccountably, it struck the ground about 12 feet below the runway elevation and burst into flames. The third accident occurred as an aircraft approached Salt Lake City over dark land. The lights of the city twinkled in the distance, but the plane made too rapid a descent and crashed short of the runway. Months later, a Japanese airliner approached Tokyo at night. The flight ended tragically as the plane, its landing gear not yet lowered, struck the waters of Tokyo Bay 6 miles from the runway.

Analysis of these four accidents, as well as others, suggested a common pattern. All occurred at night under clear weather conditions, so that the pilots were operating under visual flight rules rather than performing instrument landings. In each instance, the plane was approaching city lights over dark areas of water or land. In all cases, the lights in the background sloped upward to varying degrees. Finally, all of the planes crashed short of the runway. These observations led a Boeing psychologist, Conrad L. Kraft, to suspect that the cause of the crashes might be pilot error based on some sort of visual illusion.

Method

To test this possibility, Boeing engineers constructed an apparatus to simulate night landings (Figure 4.46). It consisted of a cockpit and a miniature lighted "city" named Nightertown. The city moved toward the cockpit on computer-controlled rollers, and it could be tilted to simulate various terrain slopes. The pilot could control simulated air speed and rate of climb and descent, and the Nightertown scene was controlled by the pilot's responses just as a true visual scene would be.

The participants were 12 experienced Boeing flight instructors who made virtual reality "landings" at Nightertown under systematically varied conditions created by the computerized simulator. All of their landings were visual landings so as to be able to test whether a visual illusion was occurring. Every aspect of their approach and the manner in which they controlled the aircraft was measured precisely.

FIGURE 4.46 Conrad Kraft, a Boeing psychologist, created an apparatus to study how visual cues can affect the simulated landings of airline pilots. Pilots approached Nightertown in a simulated cockpit. The computer-controlled city could be tilted to reproduce the illusion thought to be responsible for fatal air crashes.

Results

The landings made by the flight instructors were nearly flawless until Kraft duplicated the conditions of the fatal crashes by having the pilots approach an upward-sloping distant city over a dark area. When this occurred, the pilots were unable to detect the upward slope, assumed that the background city was flat, and consistently overestimated their altitude. On a normal landing, the preferred altitude at 4.5 miles from the runway is about 1,240 feet. As Figure 4.47 shows, the pilots approached at about this altitude when the simulated city was in a flat position. But when it was sloped upward, 11 of the 12 experienced pilot instructors crashed about 4.5 miles short of the runway.

Critical Analysis

This study shows the value of being able to study behavior under highly controlled conditions and with precise measurements. By simulating the conditions under which the fatal crashes had occurred, Kraft identified the visual illusion that was the source of pilot error. He showed that the perceptual hypotheses of the flight instructors, like those of the pilots involved in the real crashes, were tragically incorrect. It would have been ironic if one of the finest jet liners ever built had been removed from service because of presumed mechanical defects while other aircraft remained at risk.

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Research Close-Ups

Each Research Close-Up describes and critically evaluates a high-interest study. Presented in a simplified journal format (background, method, results, critical analysis), these high-interest studies represent a diversity of research methods.

Applications of Psychological Science

This feature compellingly shows the student how principles derived from basic research have direct individual and social applications. Some features provide direct guidelines for the student's personal benefit, whereas others focus on more global societal issues.

APPLICATIONS OF PSYCHOLOGICAL SCIENCE

Making Close Relationships Work: Lessons From Psychological Research

Close relationships go through good times and bad, persisting or dissolving over time. Consider marriage. Though highly intimate, this union often is fragile. In the United States, about half of first marriages end in divorce, and the failure rate for second marriages is higher. How can people make their close relationships more satisfying and stable? Recent research on marriage suggests several answers that also can be applied to dating relationships and friendships.

For decades, most marital research simply asked people about their marriages. But as Figure 9.23 shows, researchers are now bringing couples into laboratories to videotape their interactions and to chart their facial and physiological responses as they discuss emotionally charged issues (Gottman et al., 1999; Kiecolt-Glaser et al., 1998). Rather than focusing only on unhappy couples to find out what is going wrong in their relationships, researchers are also studying happy couples to discover the secrets of their success.

Using these methods and new marital interview techniques, psychologists have predicted whether marriages will last or dissolve with impressive accuracy (Carrère et al., 2000). In one laboratory study, John Gottman and his coworkers (1998) collected behavioral and physiological data from 130 newlywed couples as they discussed areas of marital conflict (e.g., in-laws, finances, sex) during the first six months of their marriage. Six years later, participants reported being happily married, unhappily married, or divorced. Using data collected while the couples were newlyweds, the researchers predicted which marriages would end in divorce with 83 percent accuracy, and the degree of marital satisfaction in still-married couples with 80 percent accuracy.

Surprisingly, the amount of anger expressed by husbands and wives in their laboratory interactions predicted neither stability nor happiness six years later. Instead, the crucial factor was the manner in which couples dealt with their anger. Particularly important were four behaviors that Gottman (1994) calls "The Four Horsemen of the Apocalypse": *criticism, contempt, defensiveness,* and *stonewalling* (listener withdrawal and nonresponsiveness).

Couples headed for unhappiness or divorce often exhibit these behaviors while discussing conflict, thereby escalating their conflict and negative emotions. When the wife criticizes the husband, he often stonewalls and withdraws from her attempts to reach some resolution. Her resulting frustration leads to stronger emotional displays and criticism, and the interaction degenerates into exchanges of contempt in which the partners tear down each other. Once this negative cycle develops, even positive overtures by one spouse are likely to evoke a negative response from the other (Margolin & Wampold, 1981).

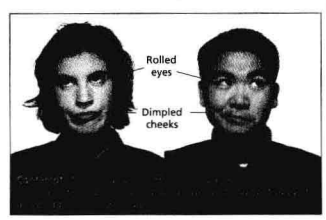

FIGURE 9.23 In John Gottman's "love lab," married couples (husband visible in rear) are filmed while interacting. Facial expressions, actions, heart rate, breathing rate, perspiration, fidgeting, and other responses are measured.

Happily married couples experience conflict and anger too, but do not allow the spiral of negativity to get out of control. Instead, they make frequent "repair attempts" to resolve their differences in a spirit of mutual respect and support. Gottman and his coworkers (1998) found that in happy marriages, the wife often introduced the conflict topic in a softened or low-intensity manner, rather than

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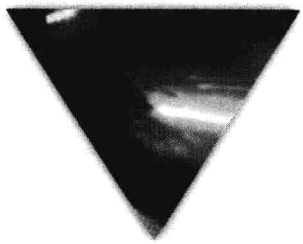
CONTENTS IN BRIEF



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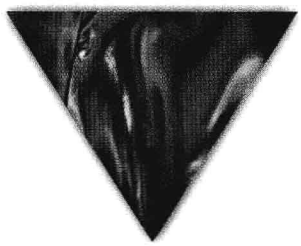
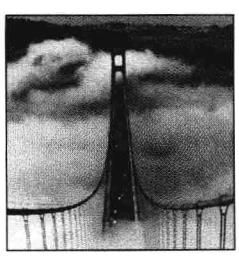


CHAPTER 3
BIOLOGICAL FOUNDATIONS OF BEHAVIOR 78

The biological perspective is creating some of the most exciting frontiers in psychology. Everything psychological reflects interactions between complex biological systems and the environment. You will learn about the workings of the nervous, endocrine, and immune systems, and how these systems work together and with environmental factors to affect our mental life, behavior, and well-being. We also examine recent work on evolutionary and genetic influences on behavior.

CHAPTER 4
SENSATION AND PERCEPTION 130



The miracle of perception results from our nervous system's translation of environmental stimuli into the language of nerve impulses. The brain uses this input to create our moment-to-moment experiences. We explore our windows to the external and internal worlds, as well as the role of social, cultural, personality, and experiential factors in forming our perceptions. We find that there are critical periods for the development of certain perceptual abilities.

CHAPTER 5
STATES OF CONSCIOUSNESS 180

The mysteries of consciousness have perplexed humankind for ages. After exploring some aspects of "normal" waking consciousness and differing views on the nature of the mind, you will learn how biological rhythms affect our mental states. Next, you will explore the fascinating world of sleep, sleep disorders, and dreams, and then examine how drugs influence consciousness. After seeing how drug effects depend on chemical, psychological, and environmental factors, you will learn about hypnosis and discover why it is controversial.

CHAPTER 6
LEARNING AND ADAPTATION: THE ROLE OF EXPERIENCE 226

Learning enables us to adapt to diverse and ever-changing environments. Beyond the wide array of learned skills that we perform every day—from tying our shoes to telling time and using computers—you will see that learning also affects our emotional reactions, our attitudes, and even our physical health. The chapter explores the major psychological processes by which learning occurs, examines their applications, and provides you with practical guidelines for modifying behaviors that you wish to change.

CHAPTER 7
MEMORY 272

Memory enriches our lives and enables us to learn from experience. After describing the case of a famous patient with amnesia (memory loss), we discuss how information is entered into memory, stored, and later retrieved. We explore the frailties of memory—reasons for forgetting and factors that distort what we remember—and examine societal controversies concerning eyewitness testimony, children's memory, and repressed memories of sexual abuse. You will discover ways to improve your memory, and learn about people with exceptional memory.