The background of the cover is a photograph of an ancient stone building. The walls are made of rough, stacked stones. At the top of the wall, there is a row of dark, vertical wooden posts or spikes. In the center, there is a large, rectangular doorway. Through the doorway, another similar stone building is visible in the distance, creating a sense of depth. The lighting is warm, suggesting a sunset or sunrise.

# INTRODUCTION TO PSYCHOLOGY

4th  
Edition

James W. Kalat



# TO PSYCHOLOGY

FOURTH EDITION

JAMES W. KALAT

*North Carolina State University*



Brooks/Cole Publishing Company

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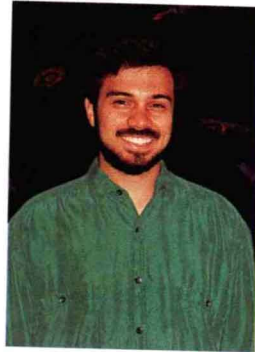
# INTRODUCTION TO PSYCHOLOGY

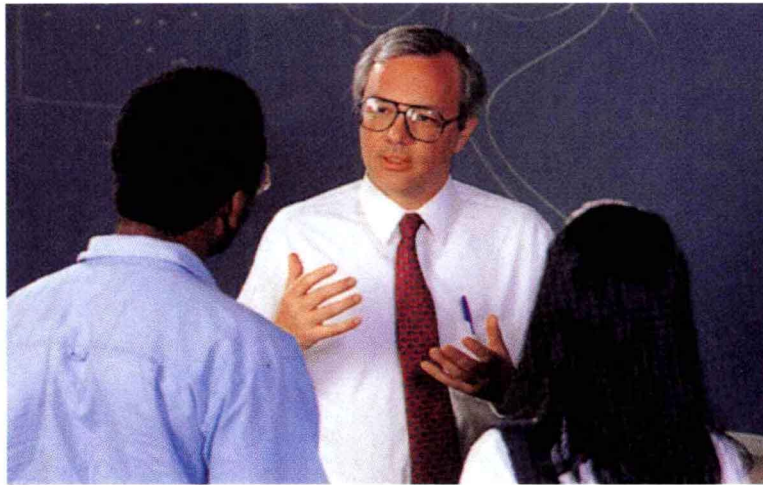


# INTRODUCTION



*To David and Julie,  
Sam,  
Robin.*





### *A Note About the Author*

Jim Kalat (rhymes with ballot) has been teaching the introductory psychology course at North Carolina State University since 1977. He received a bachelor's degree summa cum laude from Duke University in 1968 and a Ph.D. in psychology from the University of Pennsylvania in 1971. Recipient of Duke's Alumni Outstanding Teacher Award and North Carolina State University's Outstanding Teacher Award, Jim is a Fellow of the American Association for the Advancement of Science, the American Psychological Association, and the American Psychological Society, of which he was the program committee chair in 1991. Besides being the author of the best-selling *Biological Psychology* (the Fifth Edition was published by Brooks/Cole in 1995), Jim has published articles in many psychological journals.



# PREFACE TO THE INSTRUCTOR

Teaching psychology means far more than just changing what students know. It means changing how they think. It means ensuring that something worthwhile remains long after they have forgotten the details.

When students leave my Introduction to Psychology classroom, I certainly want them to know the field's important theories and research. But more importantly, I want them to learn the habit of questioning assertions—Freud's assertions, Skinner's, the president's, the newspaper's, their English professor's, their roommate's, mine. I want them to ask for the evidence and to know how to recognize holes in it.

I do not believe that a textbook can instill that habit of questioning assertions merely by means of boxes that are labeled "Critical Thinking." If students are going to form the habit, the author must model it in the normal course of covering the field. I have tried to do so with this book. Consistently, I interweave material that challenges students to examine the evidence (or lack of it) behind some common assertions. "A Guide Through the Book" following the Preface offers specifics on how this textbook can help students question for themselves, look for more than pat answers, and ultimately learn to appreciate the excitement of psychological inquiry.

## WHAT'S NEW IN THE FOURTH EDITION

This revision includes more than 400 new references from the 1990s. Every chapter has new material plus reorganization and increased clarification of old material. Many of

the figures and photographs have been revised or replaced. Here are a few of the major changes:

- The text includes more cross-cultural examples. These are infused where relevant throughout the text, not set aside as a special section.
- The chapter on development has been moved from Chapter 6 to Chapter 10. Thus the text covers memory, cognition, and language before it covers the development of memory, cognition, and language.
- I have added or enhanced the discussion of some controversial topics in psychology, including extrasensory perception (Chapter 2), the possibility of "recovered memories" (Chapter 7), ethnic differences in IQ performances and *The Bell Curve* (Chapter 9), factors influencing sexual orientation (Chapter 11), lie detection and integrity tests (Chapter 12), why Freud abandoned his seduction theory (Chapter 13), what is "abnormal" (Chapter 14), the effectiveness of psychotherapy (Chapter 15), and the sociobiology of mate choice (Chapter 16).
- New "What's the Evidence?" sections replace the old ones in Chapters 5, 10, 12, and 15.
- Chapter 6 (Learning) now includes a new module on the goals and assumptions of behaviorism.
- Chapter 7 (Memory) has been completely reorganized, with new or much-revised discussion of working memory, how to improve memory, effects of emotional intensity on memory, source amnesia, effects of education on memory strategies, infant amnesia and old-age memory deficits, and story memory.
- Applied Psychology, which was available as a supplementary booklet for the third edition, is now included in the text itself.

## TEACHING AND LEARNING AIDS FOR THIS BOOK

A number of important ancillaries accompany the text. For more information about these materials, please contact your local representative.

### STUDY GUIDE

Ruth H. Maki of North Dakota State University has prepared a Study Guide that pro-



vides chapter outlines, multiple-choice questions, short-answer essay questions, practice tests, and a new English as a Second Language section contributed by Jack Kirschenbaum of Fullerton College. An interactive electronic Study Guide is available for Mac, DOS, and Windows. For U.S. customers, the text and study guide can be packaged together for a discount (ISBN: 0-534-32951-9).

### INSTRUCTOR'S RESOURCE GUIDE

Arthur J. Kohn of Pacific University has prepared a thorough and creative Instructor's Resource Guide. This 1,000-page volume includes suggestions for elaborating on the text, complete lectures, thoughts for promoting discussion, class demonstrations, out-of-class activities, Kalat's answers to the text's "Something to Think About" questions, handouts, and transparency masters.

### TEST ITEM FILE

Written by Kalat and Thomas B. Stonebraker of Greenville College, this test bank includes more than 4,000 test items categorized as conceptual, factual, and definition. Most items have been class-tested, and item analysis is provided in the printed form of the test bank. We also offer a computerized testing system for Mac, DOS, and Windows.

### TRANSPARENCIES

Two extensive sets of transparencies are available free upon adoption: approximately 140 text-specific, full-color transparencies selected by Kalat, and a set of 95 full-color introductory psychology transparencies.

### PSYCH LAB I AND II

Created by Roger Harnish of the Rochester Institute of Technology, these interactive software programs provide psychology demonstrations and simulations, available for DOS and Mac.

### CAREER ENCOUNTERS IN PSYCHOLOGY VIDEO

Brooks/Cole has an exclusive agreement to offer this 30-minute video produced by the APA free to adopters of this text.

### ANIMATIONS PLUS! VIDEODISC

Produced by Brooks/Cole, this videodisc includes a collection of animations with still frame review and quizzing, diagrams, and video segments. The videodisc comes with an Instructor's Guide including bar codes.

### MULTIMEDIA CD-ROM AVAILABLE FALL 1996

Authored by Drs. Arthur and Wendy Kohn and a development team at Pacific University, this CD provides students with dramatic new ways to learn psychology. Exceptionally easy to use, it enables students to independently explore important concepts via interactive experiments, animations, video clips, and images. All materials are directly keyed to the textbook. An instructor's version, available upon adoption of the student version, allows professors to readily assemble and present impressive multimedia lectures.

### BROOKS/COLE FILM AND VIDEO LIBRARY FOR PSYCHOLOGY

- *The Pennsylvania State University's PCR: Films and Videos in the Behavioral Sciences*—adopters can choose from the world's largest collection of films and videos on human behavior.
- *The Brain* videotapes—30 video modules and a faculty guide prepared by Frank Vattano of Colorado State University in conjunction with the Annenberg/CPB Project Video Collection.
- *The Mind* videotapes—38 brief video modules offering examples of important concepts in introductory psychology and a faculty guide prepared by Frank Vattano of Colorado State University in cooperation with WNET, New York.
- *Seeing Beyond the Obvious: Understanding Perception in Everyday and Novel Environments*—a videotape that provides an introduction to basic concepts of visual perception, created by NASA Ames Research Center in conjunction with the University of Virginia.
- *Discovering Psychology* videotapes—a series of 26 programs from the Annenberg/CPB Collection.

### ACKNOWLEDGMENTS

A potential author needs self-confidence bordering on arrogance just to begin the job of writing a textbook. To complete it, the writer needs the humility to accept criticism of his or her favorite ideas and most carefully written prose. A great many people have provided helpful suggestions that have made this a far better text than it would have been otherwise.

Less than a year before this edition was published, I was frankly doubtful that I

would find the time or wherewithal to complete the task on schedule. My wife Ann and my editor, Jim Brace-Thompson, provided consistent encouragement, confidence, support, and patience. To them, my deepest thanks. My special thanks also to Nancy Margolis, whose help made an enormous difference in my completing this edition on time.

John Boykin worked vigorously and creatively to improve the already-outstanding set of figures and illustrations that he orchestrated for the third edition. The fact that I knew I could trust his judgment enabled me to delegate to him much of the work on the illustrations. He has developed illustrations that I consider creative, attractive, and educational; it has been a joy for me to work with him again.

In preparing this edition, I have had the opportunity to work with some very skilled and dedicated people. Kirk Bomont did an excellent job of supervising the production. Eileen Murphy, who managed the art development, and Roy Neuhaus, who designed the cover, had enough patience and artistic judgment to counterbalance their very non-artistic author. Mel Wanamaker, the designer, and Sabu Advani, the copyeditor, were skillful, efficient, and very pleasant colleagues. Faith Stoddard did a marvelous job of coordinating all the supplementary and ancillary materials. May Clark accomplished the nearly impossible task of managing all of the requests for permissions. Gay Meixel planned and executed the marketing strategies. Heather Dutton kept track of all the changes in the illustrations. To each of these, my thanks and congratulations.

My sincere thanks also to the staff of GTS Graphics, the company that produced the book. Richard Lange and Margaret Pinette did a remarkable job of taking a late manuscript and meeting an early publication date. Ann Beurskens, the photo researcher, found wonderful photographs to satisfy my vague descriptions of what the text needed.

Art Kohn has been a source of a number of creative ideas on how to approach certain topics; he has also been a stimulating person to talk to and a good friend. My colleagues at North Carolina State University provided me with encouragement, ideas, and free advice. I thank particularly Lynn Baker-Ward,

Rupert Barnes-Nacoste, Don Mershon, and David Martin.

I thank the following people for their helpful reviews on earlier drafts of all or part of the book: Ruth Ault, Davidson College; Susan Baillet, University of Portland; Elaine Baker, Marshall University; Ilene Bernstein, University of Washington; Bob Brown, University of North Carolina at Wilmington; James Calhoun, University of Georgia; Marie Caulfield, Boston VA Medical Center; Tom Collins, Mankato State University; George Domino, University of Arizona; Ralph Erber, DePaul University; Frank Hager, Allegany Community College; Leonard Hamilton, Rutgers University; W. Bruce Haslam, Weber State University; Nils Hovik, Lehigh County Community College; Pam Hufnagel, Pennsylvania State University at Dubois; Craig Jones, Arkansas State University; Ruth Maki, North Dakota State University; Duane McClearn, Elon College; Neil McGrenaghan, Humber College; Bill Moore, Marshall University; Albert Neal, Central Michigan University; Bethany Neal-Beliveau, Indiana University-Purdue University at Indianapolis; Joan Piroch, Coastal Carolina University; Kenneth Rosenberg, SUNY-Oswego; Joan Roy, University of Regina; Susan Schenk, Texas A&M University; Carl Scott, University of St. Thomas; Paul Turner, David Lipscomb University; William F. Vitulli, University of South Alabama; and Amy Wolfson, College of the Holy Cross. I especially thank Mark Leary, Wake Forest University, for his extensive help with Chapter 16.

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James Kalat



# PREFACE TO THE STUDENT

Welcome to introductory psychology! I hope you will enjoy reading this text as much as I enjoyed writing it. When you finish, I hope you will write your comments down and mail them to me at: James W. Kalat, Department of Psychology, Box 7801, North Carolina State University, Raleigh, NC 27695-7801. Please include a return address.

The first time I taught introductory psychology, several students complained that the book we were using was interesting to read but impossible to study. What they meant was that they had trouble finding and remembering the main points. I have tried to make this book easy to study in many ways. I have tried to select interesting material and to present it as clearly as possible.

In addition, I have included some special features to aid your study. Each chapter begins with an outline and a brief introduction to the topic. Every chapter except Chapter 1 is divided into two or more major sections, or modules. Each module begins with one or more questions—the fundamental questions that psychologists are trying to answer, the questions that motivate research. In some cases you will be able to answer the question after you read the section; in other cases you will not, because psychologists themselves are not sure about the answers. At the end of each module you will find a summary of some important points, with page references. If you find one of the summary points unfamiliar, you should reread the appropriate section.

Throughout the text you will find certain words highlighted in **boldface type**. These are important terms whose meaning you should understand. All the boldface terms in the text are listed with their definitions at the end of

the chapter. They also appear in the Glossary/Subject Index at the end of the book. You might want to find the Glossary/Subject Index right now and familiarize yourself with it. Note that when you look up a term you find both its definition and page references to help you find it in the text. Note also the Theme Index, which directs you to places in the text that discuss general issues such as gender influences and cultural influences on behavior.

You should learn the meaning of the boldface terms, but don't concentrate your study on them too heavily. I sometimes meet students who think they have mastered the course if they have memorized all the definitions. That's a mistake. You need to understand sentences that use these terms, and you should be able to recognize what is an example of the term and what is not. But don't waste time memorizing definitions word for word.

At various points in the text you will find a question or two under the heading "Concept Check." These questions do not ask you to simply repeat what you have read but rather to use or apply the information in some way. Try to answer each of these questions, and then turn to the indicated page to check your answer. If you cannot answer a Concept Check correctly, you probably have not been reading carefully enough, and you might want to reread the section in which the Concept Check occurs.

You will also find an occasional section marked "Something to Think About." These sections pose questions that require you to go beyond what is discussed in the text. In some cases there is no single right answer; there may be a number of reasonable ways to approach the question. I hope you will think about these questions, perhaps talk about them with fellow students, and maybe ask your instructor what he or she thinks.

I would like to deal with a few of the questions that students sometimes raise about their textbooks:

**Do you have any useful suggestions on study habits?** Whenever students ask me why they did so badly on the last test, I ask, "When did you read the assignment?" They sometimes answer, "Well, I didn't exactly read *all* of the assignment," or "I read it the night before the test." To do your best, read each assignment *before the lecture*. Within 24 hours after the lecture, read over your lecture

notes. Then, before you take the test, reread both the textbook assignment and your lecture notes. If you do not have time to reread everything, at least skim the text and reread the sections on which you need to refresh your memory. As a rule, if you are not satisfied with your test scores, you need to spend more time studying.

Some students, however, spend enough time studying without spending that time effectively. If you are reading the material without remembering it, perhaps you are not thinking about the material while you read it. As you read this book, try to think actively about what you are reading. One way to improve your studying is to read by the SPAR method: Survey, Process meaningfully, Ask questions, Review. The steps are as follows:

- **Survey:** When you start a chapter, first look over the chapter outline to get a preview of the chapter's contents. When you start a major section of a chapter, turn to the end of the section and read the summary. Then when you begin to read the chapter you know what to expect and you can focus on the main points.
- **Process meaningfully:** Read the chapter carefully. Stop to think from time to time. Tell your roommate some of the interesting things you learn. Think about how you might apply a certain concept in a real-life situation. Pause when you come to the Concept Checks and try to answer them. Good readers read quickly through unimportant or familiar material, but slowly through difficult and unfamiliar material.
- **Ask questions:** When you finish the chapter, try to anticipate some of the questions you might be asked later. You can take questions from the Study Guide or you can compose your own questions. Write out your questions and think about them, but do not write your answers yet.
- **Review:** Pause for a while—at least several hours, or, better yet, a day or two. If you first read a chapter before class, come back to the chapter the evening after class. Now write out the answers to the questions you wrote earlier. Check your answers against the text or against the answers given in the Study Guide. Reinforcing your memory a day or two after first reading the chapter will help you retain the material longer and with deeper understanding. If you study the same material several times, spaced over lengthy

intervals, you increase your chance of remembering it long after the course is over.

**Is it worthwhile to buy and use the Study Guide?** The Study Guide is designed to help students who have trouble studying, remembering the material, or answering multiple-choice questions. It is most likely to be helpful to freshmen and to students who have had trouble with similar courses in the past. It provides examples of multiple-choice questions, giving not only the correct answers but also explanations of why they are correct.

In the Study Guide for this text, written by Ruth Maki of North Dakota State University, you can work through each chapter in one or two hours. If you are willing to devote that much time to it, I believe the Study Guide will help you.

**Does it help to underline or highlight key sentences while reading?** Maybe, but don't overdo it. I have seen books in which a student underlined or highlighted more than half the sentences. What good that does, I have no idea.

**What do those parentheses mean, as in "(Maki & Serra, 1992)"?** Am I supposed to remember the names and dates? Psychologists generally cite references not by footnotes but in parentheses. "(Maki & Serra, 1992)" refers to a publication written by Maki and Serra and published in 1992. All the references cited are listed in alphabetical order according to the author's name in the References section at the back of the book.

You will also notice a few citations that include two dates separated by a slash, such as "(Wundt, 1862/1961)." That citation refers to a publication originally written by Wundt in 1862, republished in 1961. (The original was in German; the republication, in English.)

No one expects you to memorize the names and dates in parentheses. The references are provided in case you want to look up the source of a statement and check for further information. A few names *are* worth remembering, however. For instance, you will read about the research and theories of some famous psychologists, such as B. F. Skinner, Jean Piaget, and Sigmund Freud. You will certainly be expected to remember those names and a few others. But names that are important to remember are emphasized, not buried in parentheses.



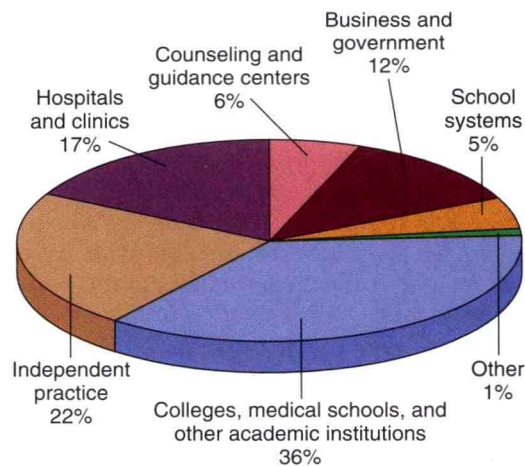


FIGURE 1 Pie graph

Can you give me any help on how to read and understand graphs? The graphs in this book are easy to understand. Just take a minute or so to study them carefully. You will find four kinds: pie graphs, bar graphs, line graphs, and scatter plots. Let's look at each kind.

- *Pie graphs* show how a whole is divided into parts. Figure 1 shows that more than one-third of all psychologists take a starting job with a college or some other educational institution. Another one-fifth to one-fourth of psychologists work in independent practice. The total circle represents 100% of all psychologists.

• *Bar graphs* show the frequency of events that fall into one category or another. Figure 2 shows how many adults in the United States suffer from certain psychological disorders. The length of a bar represents the frequency of a particular disorder.

• *Line graphs* show how one variable is related to another variable. In Figure 3 you see that newborn infants spend about 16 hours a day asleep. As they grow older, the amount of time they spend in two types of sleep gradually decreases.

• *Scatter plots* are similar to line graphs, with this difference: A line graph shows averages, whereas a scatter plot shows individual data points. By looking at a scatter plot, we can see how much variation occurs among individuals.

To prepare a scatter plot, we make two observations about each individual. In Figure 4 each student is represented by one point. If you take that point and scan down to the *x*-axis, you find that student's SAT score. If you then scan across to the *y*-axis, you find that student's grade average for the freshman year. A scatter plot shows whether two variables are closely related or only loosely related.

**We may have to take multiple-choice tests on this material. How can I do better on those tests?**

1. Read all of the choices carefully. Do not choose the first answer that looks correct; first make sure that the other answers are wrong. If two answers seem reasonable, decide which of the two is better.

2. If you don't know the correct answer, make an educated guess. Start by eliminating any answer that you know cannot be right. An answer that includes absolute words such as *always* or *never* is probably wrong. Also eliminate any answer that includes terms that are unfamiliar to you. (Correct choices use only terms that you should know; incorrect choices may include obscure terms or even outright nonsense.)

3. After you finish a test, go back and check your answers and rethink them. You have probably heard the advice, "Don't change your answers; stick with your first impulse." No matter how often you have heard that advice, it is wrong. J. J. Johnston (1975) tested it by looking through the answer sheets of a number of classes that had taken a multiple-choice test. He found that of all

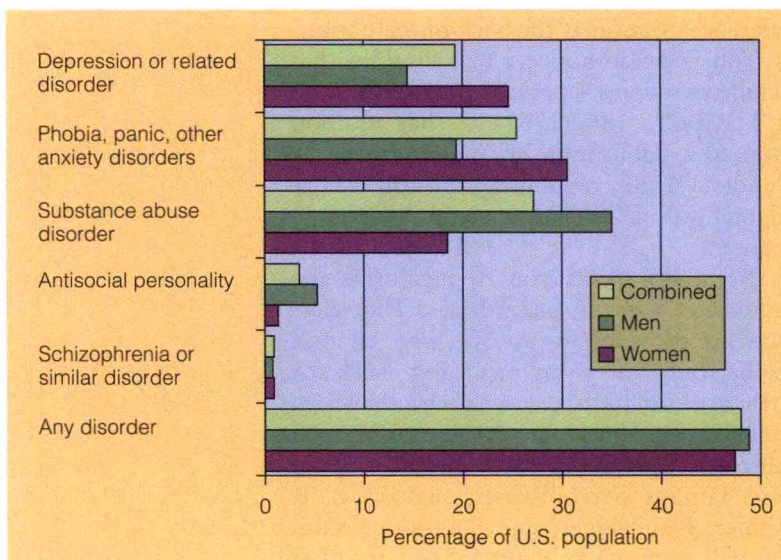
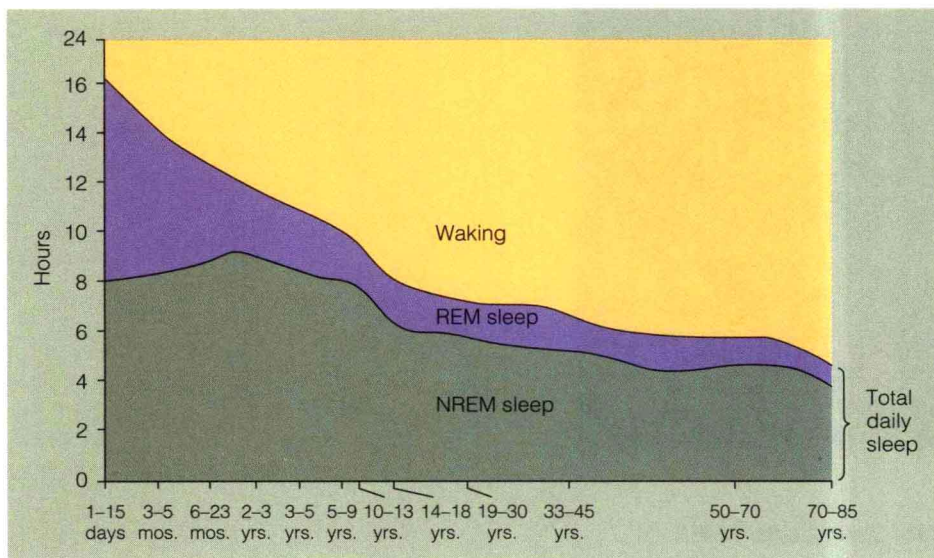
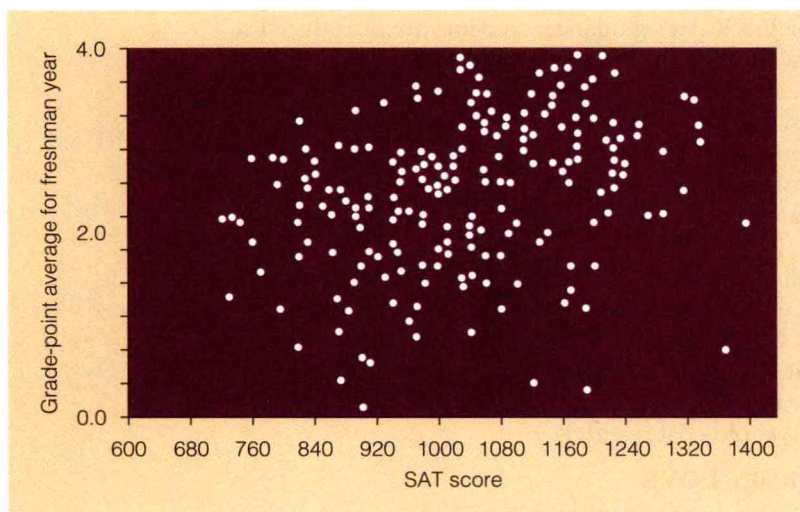


FIGURE 2 Bar graph



**FIGURE 3** *Line graph*



**FIGURE 4** *Scatter plot*

the students who changed one or more answers, 71 students improved their scores by doing so and only 31 lowered their scores. Similar results have been reported in a number of other studies. I do not mean that you should make changes just for the sake of making changes. But there are many reasons why your reconsidered answer might be better than your first impulse. For one, sometimes when you read the later questions on a test, one of them may remind you of something that helps you answer an earlier question. Also, you sometimes reread a question and realize that you misunderstood it the first time you read it.

Why, then, do so many students (and professors) believe that it is a mistake to change an answer? Imagine what happens when you take a test and get your paper back. When you look it over, which items do you examine most carefully? The ones you got wrong, of course. You may notice three items that you originally answered correctly and then changed. You never notice the five other items you changed from incorrect to correct.

James Kalat



# A GUIDE THROUGH THE BOOK

## **A NOTE FROM THE PUBLISHER**

The scientific method is the most powerful tool in the psychologist's—and, indeed, the student's—intellectual armory. In this book, students learn that questioning assertions, challenging evidence, and evaluating results—all components of the scientific method—are second nature to the study of psychology itself. With author Jim Kalat's guidance, students are introduced to psychology in a way that will remain with them long after they may have forgotten specific theories, experiments, and results.

The material that follows demonstrates how Jim Kalat encourages students to experience for themselves the excitement of psychological discovery and how he uses the scientific method as a consistent theme throughout the book. His carefully integrated learning tools clarify psychology's important theories and research.

Kalat's remarkable skill in getting students involved in using the scientific method to question assertions is what distinguishes *Introduction to Psychology, Fourth Edition*. Most books present the research and facts and expect students to memorize what's been discovered. Kalat encourages them to open the doors to further exploration: He helps his readers become more intelligent consumers of psychological research.

## **A BOOK STUDENTS TRULY LOVE**

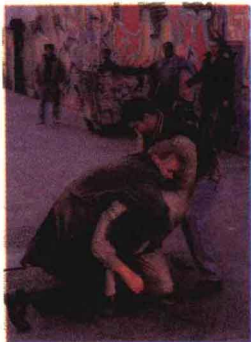
Throughout the text, Jim Kalat does more than tell students what they ought to know—he engages their desire to learn. He speaks directly to his readers, drawing them into psychological concepts and information in a way that actually changes the way they look at assertions and facts. Kalat's engaging and involving writing style—coupled with humor, personal anecdotes, and exercises students can try themselves—helps make the Fourth Edition an exceptional learning tool, one your students will truly enjoy.

## AN INTRODUCTION TO THE POWER OF QUESTIONING ASSERTIONS

Chapter 2 is the most important chapter in the book. It not only deals with the procedures for conducting research but also provides a conceptual guide to how psychologists evaluate evidence and theories and, in general, to how they think. For example, it highlights the importance of replicability, the criterion of falsifiability, and the principle of parsimony.

Early in Chapter 2, Kalat presents an overview of the research process. He introduces the *four steps* in gathering and evaluating evidence—**1** Hypothesis, **2** Method, **3** Results, and **4** Interpretation. This critical material—the heart of the scientific method—is then reinforced throughout the text.

Psychologists seek solid evidence to establish that watching televised violence increases the viewer's probability of violent behavior. Good research does more than just establish the connection between the two; it also can tell us how strong the connection is, what kinds of televised violence are most dangerous, and which kinds of viewers are most susceptible.



**1 Hypothesis** Any study begins with a hypothesis, which is a testable prediction of what will happen under certain conditions. In many cases the hypothesis is the product of someone's casual observations. For example, a psychologist might notice that children who like to watch violent television programs seem to be relatively violent themselves. So it seems, at any rate, we cannot always trust our impressions. The psychologist might then set out to test whether those children who watch the greatest amount of violence on television engage in the greatest amount of aggressive behavior.

**2 Method** Devising an appropriate method to test a hypothesis can be surprisingly difficult. For example, an investigator wants to measure how much violence each child watches on television. That may sound easy. But what counts as violence? Do we count minutes of violent programming, or do we count violent acts? Do some types of violence count more than others? An experimenter needs to select methods of controlling or measuring all the important events and behaviors in the study. The precision of that control or measurement will determine the usefulness of the research.

**3 Results** Suppose the investigator somehow measures televised violence and aggressive behavior. Then the task is to determine the

relationship between the two measures. Did the children who watched the greatest amount of violence also engage in the most aggressive behavior? If so, how strong was the relationship? Were the results convincing, or might they have arisen by accident? Here the investigator calls upon statistical techniques to evaluate the results.

**4 Interpretation** Finally, the task is to determine what the results mean. Sometimes the results clearly contradict the hypothesis. For example, an investigator might find that children who watch a great deal of televised violence are no more aggressive than other children in general. In that case we might abandon the hypothesis or we might modify it. Maybe it applies only to certain kinds of children or to certain kinds of violence. If the results match the prediction, we would look for other possible explanations before we draw a conclusion. Suppose, for example, the investigator finds that the children who watched the most violence on television were also prone to the most aggressive behavior. We should not necessarily conclude that televised violence leads to aggressive behavior, because of an alternative interpretation: Perhaps aggressive children like to watch violent television!

It is almost always possible to suggest more than one interpretation of the results of a given study. At that point the investigator sets up a second study to follow up on the results of the first and tries to decide between the two interpretations. That study too may lead to further studies. Because almost any study has its limitations, the ultimate conclusion comes from a pattern of results from many studies.

### REPLICABILITY

Before psychologists trust the results of a study, we like to have other investigators repeat the procedure. If others get consistently similar results, then they have **replicable results**—that is, anyone who follows the same procedure can repeat them. If a result is replicable, we still may not be sure how to interpret it, but at least we think it is worthwhile to try. If the results cannot be replicated, then perhaps there was some hidden flaw in the first study; we base no conclusions on it.

What if a result can be replicated in some studies and not in others? Such a result is not

## SCIENCE AND THE EVALUATION OF EVIDENCE

*How do scientists evaluate which theories are good and which theories are poor?*

*Why are most of them so skeptical of new theories and claims that seem to contradict our current understanding?*

**Y**ou will sometimes hear people say that something has been "scientifically proved." Scientists themselves seldom use the word *prove*, except when they are talking about a mathematical proof. As they collect more and better evidence, they may become confident about a given conclusion, but they still hesitate to say they are certain of it.

One distinguishing characteristic of science is that scientists generally agree on how to evaluate competing theories. Even when they disagree on which theory is best, they can still agree on what kinds of evidence they will accept in trying to decide. Most psychologists are quick to concede that our

knowledge of psychology is less complete and less systematic than our knowledge of physics, chemistry, and biology. But like physicists, chemists, and biologists, psychologists generally agree on what constitutes good evidence and what does not. They try to rely on the best available evidence, and to draw no conclusion at all if the evidence is weak.

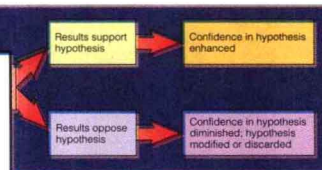
### SOMETHING TO THINK ABOUT

If ethicists agreed with each other on how to evaluate theories, could they make progress comparable to that of scientists? Could theologians?

### STEPS IN GATHERING AND EVALUATING EVIDENCE

*Above all, scientists want to know the evidence behind a given claim.* In psychology as in other fields, students should learn to question assertions, to ask what is the evidence behind a given claim and whether that evidence leads to an unambiguous conclusion.

In any scientific field, researchers conduct studies that go through a series of steps described in the following four paragraphs (see also Figure 2.1). Articles in scientific publications generally follow this sequence too. In each of the following chapters, you will find a section titled "What's the Evidence?" Those sections will go through one or more psychological investigations step by step, also in the same order.



*Experimental method tests those predictions that support the hypothesis; a disconfirmed hypothesis. Conclusions are based on the results of the experiment. Most scientists avoid speculation.*



plains that a bigger toy just like it is "in the same place" in the bigger room. (For example, if the little toy was behind the sofa in the little room, the big toy would be behind the sofa in the big room.) Most 2½-year-old children look haphazardly for the big toy in the big room without using the little room as a "map." By age 3, most children who see the little toy hidden in the little room go immediately to the correct location in the big room (DeLoache, 1989).

#### EGOCENTRIC THINKING IN THE PREOPERATIONAL PERIOD

Piaget concluded that children's thought processes are egocentric. In using this term, Piaget did not mean that children are selfish; instead, he meant that the child sees the world as centered around himself or herself and cannot take the perspective of another person. If you and a preschool child sit on opposite sides of a complicated pile of blocks and you ask the child to draw what the blocks would look like from your side, the child will draw them as they look from his or her own side. When speaking, children often omit to describe the necessary background information, as if assuming that the listener understands everything the speaker understands. (The same can be said for adults, unfortunately. Sometimes someone will start discussing the details of some topic before the listener has any idea what the speaker is talking about.)

#### CONCEPT CHECK

2. Which of the following is the clearest example of egocentric thinking?
  - a. A writer who uses someone else's words without giving credit
  - b. A politician who blames others for everything that goes wrong
  - c. A professor who gives the same complicated lecture to a freshman class that she gives to a convention of professionals. (Check your answer on page 428.)

To say that a child is egocentric is to say that he or she has trouble understanding other people's point of view, understanding what they know and what they do not know. Psychological researchers have explored this very difficult topic of what children understand about other people's thoughts and knowledge.

#### WHAT'S THE EVIDENCE?

##### Children's Understanding of Other People's Cognitions

How would you feel about walking naked through a room filled with refrigerators, radios, and other machines? You might prefer to have your clothes on, but you probably will feel no great distress. Now, how would you feel about walking naked through a classroom full of other (fully clothed) students? Extremely embarrassed and distressed, I presume, because you regard people as very different from machines. You believe that other students have conscious experiences like your own; you know that people can see you and react to you, whereas electrical appliances cannot.

How and when did we figure that out? At what age do children first understand that other people have minds and knowledge? Experimenters have developed some very clever designs to try to answer that very difficult question.

**Hypothesis** A child who understands that other people have minds will distinguish between someone who is in a position to know some relevant information and someone who could not know it.

**Method** A 3- or 4-year-old child sat in front of four cups (figure 10.16). The child watched as one adult hid a candy or toy



Young children's thinking is egocentric: understanding someone else's point of view is difficult. In this experiment, the child is asked to describe how a complicated pile of blocks would look from someone else's point of view. They describe how it looks from their own position.

**FIGURE 10.16**  
A child sat in front of a screen covering four cups and watched as one adult hid a surprise under one of the cups. Then that adult and another (who had not been present during the hiding) each pointed to one of the cups to signal where the surprise was. Many 4-year-olds consistently followed the advice of the informed adult; 3-year-olds did not.



under one of the cups, although a screen prevented the child from seeing which cup. Then another adult entered the room. The "informed" adult pointed to the cup under which he or she had just hidden the surprise;

#### WHAT'S THE EVIDENCE?

Appearing in every chapter from Chapter 2 on, each *What's the Evidence?* section presents an interesting problem and then examines one or more experiments in some detail. The format reinforces the steps of the scientific method, until it becomes part of the way students think.

These sections illustrate how scientific research is set into motion by posing a question. Then, using the scientific method of Hypothesis–Method–Results–Interpretation, Kalat walks students through one or two studies that explore the question. Where appropriate, he points out limitations in the research, ethical considerations in the methods, and alternative interpretations of the results so that students have a model of how psychologists evaluate evidence.

the "uninformed" adult pointed to one of the other cups. The child then had an opportunity to look under one cup to try to find the surprise.

This procedure was repeated 10 times for each child in the study. The two adults alternated roles, but on each trial one or the other hid the surprise when the other was absent. That is, one was in a position to know where the surprise was hidden, and the other was not.

**Results** Of the 4-year-olds, 10 out of 20 chose the correct cup (the one indicated by the informed adult) at least 8 times out of 10 tries. That is, many of the 4-year-olds showed that they understood who had the relevant knowledge and who did not. However, none of 14 3-year-olds chose the correct cup 8 times out of 10; they were as likely to follow the lead of the uninformed adult as that of the informed adult (Povinelli & deBlois, 1992).

**Interpretation** Evidently, 4-year-olds have a greater understanding of other people's knowledge (or lack of it) than 3-year-olds have.

Other experiments using a somewhat different procedure have yielded similar results. For example, children in one study watched a dramatization in which a girl who had a marble in her basket left the room temporarily, leaving the basket behind. During her absence, a second girl moved the marble from the first girl's basket to her own basket. When the first girl returned to the room, the children were asked, "Where is the marble?" and "Where will the girl look for it?" Most 4-year-olds answered that she would look in her own basket; younger children thought she would look in the other basket (Wimmer & Perner, 1983). As in the previous study, 4-year-olds are better able than younger children are to make inferences about what various people might or might not know.

Although these are important results, we should be careful of drawing too broad a conclusion. Using other methods, we can see evidence that even younger children understand something about the experiences or knowledge of other people. For example, children less than 1 year old act sad and even cry when they see another child get hurt (Hobson, 1993). That is, a child may show