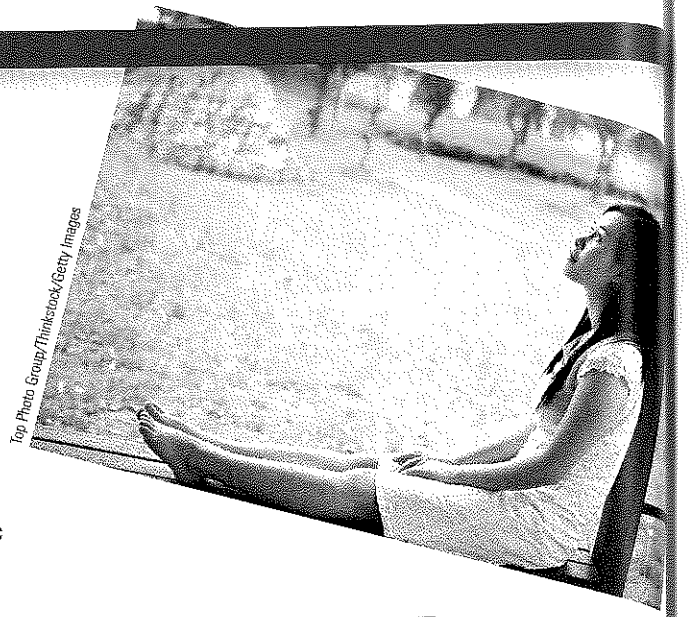
Module 4

The Need for Psychological Science



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Module Learning Objectives

4-1 Describe how hindsight bias, overconfidence, and the tendency to perceive order in random events illustrate why science-based answers are more valid than those based on intuition and common sense.

4-2 Identify how the three main components of the scientific attitude relate to critical thinking.

4-1 How do hindsight bias, overconfidence, and the tendency to perceive order in random events illustrate why science-based answers are more valid than those based on intuition and common sense?

Some people suppose that psychology merely documents and dresses in jargon what people already know: "So what else is new—you get paid for using fancy methods to prove what everyone knows?" Others place their faith in human intuition: "Buried deep within each and every one of us, there is an instinctive, heart-felt awareness that provides—if we allow it to—the most reliable guide," offered Prince Charles (2000).

Prince Charles has much company, judging from the long list of pop psychology books on "intuitive managing," "intuitive trading," and "intuitive healing." Today's psychological science does document a vast intuitive mind. As we will see, our thinking, memory, and attitudes operate on two levels—conscious and unconscious—with the larger part operating automatically, off-screen. Like jumbo jets, we fly mostly on autopilot.

So, are we smart to listen to the whispers of our inner wisdom, to simply trust "the force within"? Or should we more often be subjecting our intuitive hunches to skeptical scrutiny?

This much seems certain: We often underestimate intuition's perils. My geographical intuition tells me that Reno is

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The limits of intuition Personnel interviewers tend to be overconfident of their gut feelings about job applicants. Their confidence stems partly from their recalling cases where their favorable impression proved right, and partly from their ignorance about rejected applicants who succeeded elsewhere.

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"Those who trust in their own wits are fools." -Proverbs 28:26

Indeed, observed novelist Madeleine L'Engle, "The naked intellect is an extraordinarily inaccurate instrument" (1973). Three phenomena—*hindsight bias, judgmental overconfidence, and our tendency to perceive patterns in random events*—illustrate why we cannot rely solely on intuition and common sense.

Did We Know It All Along? Hindsight Bias

"Life is lived forwards, but understood backwards." -Philosopher Søren Kierkegaard, 1813–1855

Consider how easy it is to draw the bull's eye *after* the arrow strikes. After the stock market drops, people say it was "due for a correction." After the football game, we credit the coach if a "gutsy play" wins the game, and fault the coach for the "stupid play" if it doesn't. After a war or an election, its outcome usually seems obvious. Although history may therefore seem like a series of inevitable events, the actual future is seldom foreseen. No one's diary recorded, "Today the Hundred Years War began."

This **hindsight bias** (also known as the *I-knew-it-all-along phenomenon*) is easy to demonstrate: Give half the members of a group some purported psychological finding, and give the other half an opposite result. Tell the first group, "Psychologists have found that separation weakens romantic attraction. As the saying goes, 'Out of sight, out of mind.'" Ask them to imagine why this might be true. Most people can, and nearly all will then view this true finding as unsurprising.

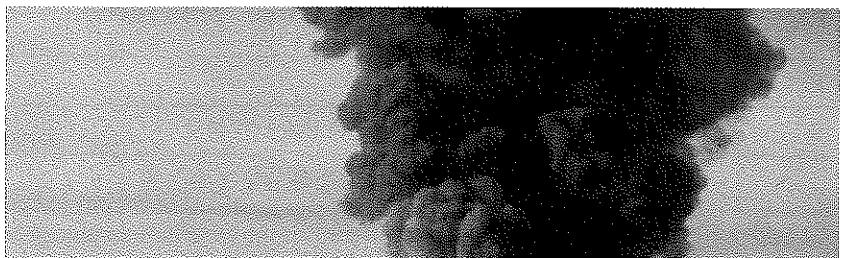
hindsight bias the tendency to believe, after learning an outcome, that one would have foreseen it. (Also known as the *I-knew-it-all-along phenomenon.*)

Tell the second group the opposite, "Psychologists have found that separation strengthens romantic attraction. As the saying goes, 'Absence makes the heart grow fonder.'" People given this untrue result can also easily imagine it, and most will also see it as unsurprising. When two opposite findings both seem like common sense, there is a problem.

Such errors in our recollections and explanations show why we need psychological research. Just asking people how and why they felt or acted as they did can sometimes be misleading—not because common sense is usually wrong, but because common sense more easily describes what *has* happened than what *will* happen. As physicist Niels Bohr reportedly said, "Prediction is very difficult, especially about the future."

"Anything seems commonplace, once explained." -Dr. Watson to Sherlock Holmes

Some 100 studies have observed hindsight bias in various countries and among both children and adults (Blank et al., 2007). Nevertheless, our intuition is often right. As Yogi Berra once said, "You can observe a lot by watching." (We have Berra to thank for other gems, such as "Nobody ever comes here—it's too crowded," and "If the people don't want to come out to the ballpark, nobody's gonna stop 'em.") Because we're all behavior watchers, it would be



REUTERS/U.S. Coast Guard/Handout

AP® Exam Tip

It is quite common for multiple-choice questions on the AP® exam to test your knowledge of "media myths." Pay particular attention when psychological findings run counter to "common sense."

surprising if many of psychology's findings had *not* been foreseen. Many people believe that love breeds happiness, and they are right (we have what Module 40 calls a deep "need to belong"). Indeed, note Daniel Gilbert, Brett Pelham, and Douglas Krull (2003), "good ideas in psychology usually have an oddly familiar quality, and the moment we encounter them we feel certain that we once came close to thinking the same thing ourselves and simply failed to write it down." Good ideas are like good inventions; once created, they seem obvious. (Why did it take so long for someone to invent suitcases on wheels and Post-it Notes?)

But sometimes our intuition, informed by countless casual observations, has it wrong. In later modules we will see how research has overturned popular ideas—that familiarity breeds contempt, that dreams predict the future, and that most of us use only 10 percent of our brain. (See also **TABLE 4.1**.) We will also see how it has surprised us with discoveries about how the brain's chemical messengers control our moods and memories, about other animals' abilities, and about the effects of stress on our capacity to fight disease.

Table 4.1 True or False?

Psychological research discussed in modules to come will either confirm or refute each of these statements (adapted, in part, from Furnham et al., 2003). Can you predict which of these popular ideas have been confirmed and which refuted? (Check your answers at the bottom of this table.)

1. If you want to teach a habit that persists, reward the desired behavior every time, not just intermittently (see Module 27).
2. Patients whose brains are surgically split down the middle survive and function much as they did before the surgery (see Module 13).
3. Traumatic experiences, such as sexual abuse or surviving the Holocaust, are typically "repressed" from memory (see Module 33).
4. Most abused children do *not* become abusive adults (see Module 50).
5. Most infants recognize their own reflection in a mirror by the end of their first year (see Module 47).
6. Adopted siblings usually do not develop similar personalities, even though they are reared by the same parents (see Module 14).
7. Fears of harmless objects, such as flowers, are just as easy to acquire as fears of potentially dangerous objects, such as snakes (see Module 15).
8. Lie detection tests often lie (see Module 41).
9. The brain remains active during sleep (see Modules 22–23).

Answers: 1. F, 2. T, 3. F, 4. T, 5. F, 6. T, 7. F, 8. T, 9. T

About how many seconds do you think it would have taken you to unscramble each of these? Did hindsight influence you? Knowing the answers tends to make us overconfident—surely the solution would take only 10 seconds or so, when in reality the average problem solver spends 3 minutes, as you also might, given a similar anagram without the solution: OCHSA.[2]

Are we any better at predicting social behavior? University of Pennsylvania psychologist Philip Tetlock (1998, 2005) collected more than 27,000 expert predictions of world events, such as the future of South Africa or whether Quebec would separate from Canada. His repeated finding: These predictions, which experts made with 80 percent confidence on average, were right less than 40 percent of the time. Nevertheless, even those who erred maintained their confidence by noting they were "almost right." "The Québécois separatists *almost* won the secessionist referendum."

Overconfidence in history:

"We don't like their sound. Groups of guitars are on their way out." -Decca Records, in turning down a recording contract with the Beatles in 1962

"Computers in the future may weigh no more than 1.5 tons." -*Popular Mechanics*, 1949

"They couldn't hit an elephant at this distance." -General John Sedgwick just before being killed during a U.S. Civil War battle, 1864

"The telephone may be appropriate for our American cousins, but not here, because we have an adequate supply of messenger boys." -British expert group evaluating the invention of the telephone

Perceiving Order in Random Events

In our natural eagerness to make sense of our world—what poet Wallace Stevens called our "rage for order"—we are prone to perceive patterns. People see a face on the moon, hear Satanic messages in music, perceive the Virgin Mary's image on a grilled cheese sandwich. Even in random data we often find order, because—here's a curious fact of life—*random sequences often don't look random* (Falk et al., 2009; Nickerson, 2002, 2005). Consider a random coin flip: If someone flipped a coin six times, which of the following sequences of heads (H) and tails (T) would be most likely: HHHTTT or HTTHTH or HHHHHH?

Daniel Kahneman and Amos Tversky (1972) found that most people believe HTTHTH would be the most likely random sequence. Actually, all three are equally likely (or, you might say, equally unlikely). A poker hand of 10 through ace, all of hearts, would seem extraordinary; actually, it would be no more or less likely than any other specific hand of cards (**FIGURE 4.1**).

In actual random sequences, patterns and streaks (such as repeating digits) occur more often than people expect (Oskarsson et al., 2009). To demonstrate this phenomenon for myself, I flipped a coin 51 times, with these results:

1. H	10. T	19. H	28. T	37. T	46. H
2. T	11. T	20. H	29. H	38. T	47. H
3. T	12. H	21. T	30. T	39. H	48. T
4. T	13. H	22. T	31. T	40. T	49. T
5. H	14. T	23. H	32. T	41. H	50. T
6. H	15. T	24. T	33. T	42. H	51. T
7. H	16. H	25. T	34. T	43. H	
8. T	17. T	26. T	35. T	44. H	
9. T	18. T	27. H	36. H	45. T	

Figure 4.1
Two random sequences Your chances of being dealt either of these hands are precisely the same: 1 in 2,598,960.

Looking over the sequence, patterns jump out: Tosses 10 to 22 provided an

What explains these streaky patterns? Was I exercising some sort of paranormal control over my coin? Did I snap out of my tails funk and get in a heads groove? No such explanations are needed, for these are the sorts of streaks found in any random data. Comparing each toss to the next, 23 of the 50 comparisons yielded a changed result—just the sort of near 50-50 result we expect from coin tossing. Despite seeming patterns, the outcome of one toss gives no clue to the outcome of the next.

However, some happenings seem so extraordinary that we struggle to conceive an ordinary, chance-related explanation (as applies to our coin tosses). In such cases, statisticians often are less mystified. When Evelyn Marie Adams won the New Jersey lottery *twice*, newspapers reported the odds of her feat as 1 in 17 trillion. Bizarre? Actually, 1 in 17 trillion are indeed the odds that a given person who buys a single ticket for two New Jersey lotteries will win both times. And given the millions of people who buy U.S. state lottery tickets, statisticians Stephen Samuels and George McCabe (1989) reported, it was "practically a sure thing" that someday, somewhere, someone would hit a state jackpot twice. Indeed, said fellow statisticians Persi Diaconis and Frederick Mosteller (1989), "with a large enough sample, any outrageous thing is likely to happen." An event that happens to but 1 in 1 billion people every day occurs about 7 times a day, 2500 times a year.

"The really unusual day would be one where nothing unusual happens." -Statistician Persi Diaconis (2002)

The point to remember: Hindsight bias, overconfidence, and our tendency to perceive patterns in random events often lead us to overestimate our intuition. But scientific inquiry can help us sift reality from illusion.

The Scientific Attitude: Curious, Skeptical, and Humble

4-2 How do the scientific attitude's three main components relate to critical thinking?

Underlying all science is, first, a hard-headed *curiosity,* a passion to explore and understand without misleading or being misled. Some questions *(Is there life after death?)* are beyond science. Answering them in any way requires a leap of faith. With many other ideas *(Can some people demonstrate ESP?),* the proof is in the pudding. Let the facts speak for themselves.

Magician James Randi has used this *empirical approach* when testing those claiming to see auras around people's bodies:

Randi: Do you see an aura around my head?

Aura-seer: Yes, indeed.

Randi: Can you still see the aura if I put this magazine in front of my face?

Aura-seer: Of course.

Randi: Then if I were to step behind a wall barely taller than I am, you could determine my location from the aura visible above my head, right?

The Amazing Randi The magician James Randi exemplifies skepticism. He has tested and debunked supposed psychic phenomena.

"To believe with certainty," says a Polish proverb, "we must begin by doubting." As scientists, psychologists approach the world of behavior with a *curious skepticism,* persistently asking two questions: *What do you mean? How do you know?*

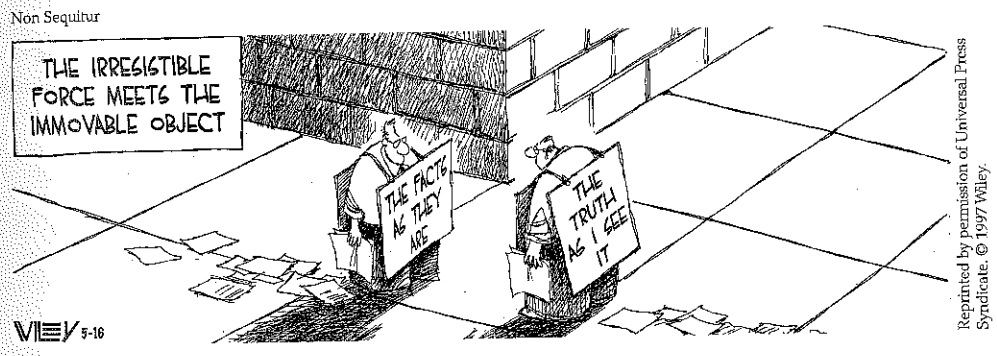
When ideas compete, skeptical testing can reveal which ones best match the facts. Do parental behaviors determine children's sexual orientation? Can astrologers predict your future based on the position of the planets at your birth? Is electroconvulsive therapy (delivering an electric shock to the brain) an effective treatment for severe depression? As we will see, putting such claims to the test has led psychological scientists to answer *No* to the first two questions and *Yes* to the third.

Putting a scientific attitude into practice requires not only curiosity and skepticism but also *humility*—an awareness of our own vulnerability to error and an openness to surprises and new perspectives. In the last analysis, what matters is not my opinion or yours, but the truths nature reveals in response to our questioning. If people or other animals don't behave as our ideas predict, then so much the worse for our ideas. This humble attitude was expressed in one of psychology's early mottos: "The rat is always right."

Historians of science tell us that these three attitudes—curiosity, skepticism, and humility—helped make modern science possible. Some deeply religious people today may view science, including psychological science, as a threat. Yet, many of the leaders of the scientific revolution, including Copernicus and Newton, were deeply religious people acting on the idea that "in order to love and honor God, it is necessary to fully appreciate the wonders of his handiwork" (Stark, 2003a,b).

"I'm a skeptic not because I do not want to believe but because I want to *know*. I believe that the truth is out there. But how can we tell the difference between what we would like to be true and what is actually true? The answer is science." -MICHAEL SHERMER, "I WANT TO BELIEVE," *SCIENTIFIC AMERICAN,* 2009

"My deeply held belief is that if a god anything like the traditional sort exists, our curiosity and intelligence are provided by such a god. We would be unappreciative of those gifts . . . if we suppressed our passion to explore the universe and ourselves." -CARL SAGAN, *BROCA'S BRAIN,* 1979



Of course, scientists, like anyone else, can have big egos and may cling to their preconceptions. Nevertheless, the ideal of curious, skeptical, humble scrutiny of competing ideas unifies psychologists as a community as they check and recheck one another's findings and conclusions.

Critical Thinking

The scientific attitude prepares us to think smarter. Smart thinking, called **critical thinking,**

critical thinking thinking that

"The real purpose of the scientific method is to make sure Nature hasn't misled you into thinking you know something you don't actually know." -ROBERT M. PIRSIG, *ZEN AND THE ART OF MOTORCYCLE MAINTENANCE*, 1974

of climate change swayed by today's weather, or by their own political views, critical thinkers say, "Show me the evidence." Over time, is the Earth actually warming? Are the polar ice caps melting? Are vegetation patterns changing? And is human activity spewing gases that would lead us to expect such changes? When contemplating such issues, critical thinkers will consider the credibility of sources. They will look at the evidence (*"Do the facts support them, or are they just makin' stuff up?"*). They will recognize multiple perspectives. And they will expose themselves to news sources that challenge their preconceived ideas.

Has psychology's critical inquiry been open to surprising findings? The answer, as ensuing modules illustrate, is plainly *Yes*. Believe it or not, massive losses of brain tissue early in life may have minimal long-term effects (see Module 12). Within days, newborns can recognize their mother's odor and voice (see Module 45). After brain damage, a person may be able to learn new skills yet be unaware of such learning (see Modules 31–33). Diverse groups—men and women, old and young, rich and middle class, those with disabilities and without—report roughly comparable levels of personal happiness (see Module 83).

And has critical inquiry convincingly debunked popular presumptions? The answer, as ensuing modules also illustrate, is again *Yes*. The evidence indicates that sleepwalkers are *not* acting out their dreams (see Module 24). Our past experiences are *not* all recorded verbatim in our brains; with brain stimulation or hypnosis, one *cannot* simply "hit the replay button" and relive long-buried or repressed memories (see Module 33). Most people do *not* suffer from unrealistically low self-esteem, and high self-esteem is not all good (see Module 59). Opposites do *not* generally attract (see Module 79). In each of these instances and more, what has been learned is not what is widely believed.

Before You Move On

▶ ASK YOURSELF

How might critical thinking help us assess someone's interpretations of people's dreams or their claims to communicate with the dead?

▶ TEST YOURSELF

How does the scientific attitude contribute to critical thinking?

Answers to the Test Yourself questions can be found in Appendix E at the end of the book.

Module 4 Review

4-1 How do hindsight bias, overconfidence, and the tendency to perceive order in random

Although limited by the testable questions it can address, scientific inquiry can help us overcome our intuition's

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Multiple-Choice Questions

1. After the student council election, a friend tells you he has known for weeks who would be elected president. What does this seem to illustrate?

a. Skepticism
b. Critical thinking
c. Hindsight bias
d. Overconfidence
e. Perceiving order in random events

2. While taking a standardized test with randomly scrambled answers, you notice that your last four answers have been "c." Which of the following is true concerning the probability of the next answer being "c"?

a. It is higher. Once a streak begins, it is likely to last for a while.
b. It is lower. Since answers are distributed randomly, "c" answers become less common.
c. It is unaffected by previous answers. It is as likely to be "c" as any other answer.
d. You should check your previous answers. Four "c's" in a row is impossible.
e. It is higher. Test constructors trick students by keeping the same answer many times in a row.

3. What do we call the tendency to exaggerate the correctness or accuracy of our beliefs and predictions prior to testing?

a. Hindsight bias
b. Overconfidence
c. Critical thinking
d. Skepticism
e. Reliability

4. Which of the following is an example of hindsight bias?

a. Tom is certain that electric cars will represent 80 percent of vehicles in twenty years and only reads research studies that support his hypothesis.
b. Liza underestimates how much time it will take her to finish writing her college application essays and as a result fails to meet an important deadline.
c. Experts predicting world events with 80 percent confidence turned out to be correct less than 40 percent of the time.
d. Marcy cannot recognize a definition on a flashcard. After turning the card over and viewing the term, she tells herself she knew what the answer was all along.
e. Dr. Grace overestimates how effectively her new treatment method works because she fails to seek out any evidence refuting her theory.

Practice FRQs

1. Name the three components of the scientific attitude. Provide an example to show how each component contributes to the investigation of competing ideas in psychology.

Answer

1 point: Curiosity, or passion to explore, leads us to questions we want to investigate. Any examples of such questions will serve (For example, Does more money make us happier? Is schizophrenia inherited?).

1 point: Skepticism keeps us from accepting ideas without

2. Aziz has read that handwriting reveals important details about personality. Explain how each component of the scientific attitude can help Aziz investigate the accuracy of the information he has read about handwriting analysis.

(3 points)