AN INTRODUCTION TO PSYCHOLOGICAL SCIENCE

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CANADIAN EDITION

Mark Krause
Southern Oregon University

Daniel Corts
Augustana College

Stephen Smith
University of Winnipeg

Dan Dolderman
University of Toronto

PEARSON
Toronto

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To my partner in life, Andrea Krause.
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Dan Dolderman

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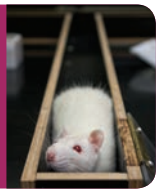
6 

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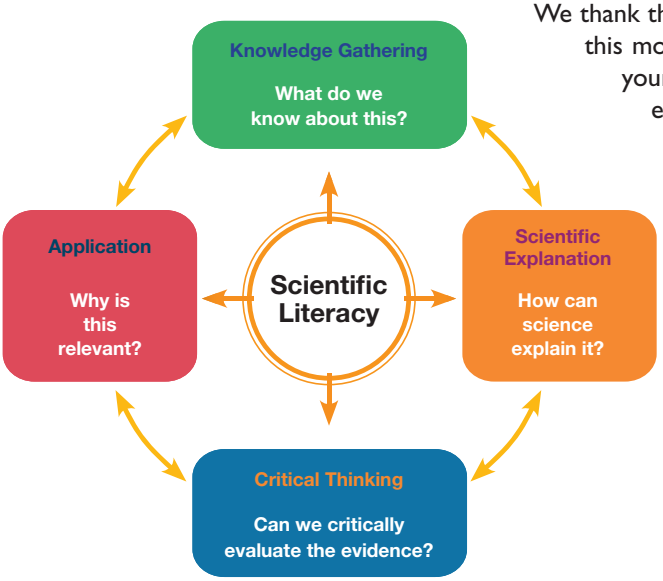
From the Authors

A well-rounded university education requires a healthy dose of science. This means not just a memorized list of scientific terms and famous names, but rather the abilities and disposition that allow students to encounter, understand, and evaluate scientific as well as nonscientific claims. This is true regardless of an individual's personal and career goals. As this text and MyPsychLab program emphasize, the science of psychology reaches across disciplinary boundaries and addresses numerous complex issues affecting individuals and society. To effectively use what they learn about psychology, students need to carry with them a scientific perspective. *An Introduction to Psychological Science* is written from the perspective of scientific literacy—the ability not only to define scientific terminology, but also to understand how it functions, to critically evaluate it, and to apply it to personal and societal matters.

Psychological science is in a privileged position to help students hone their scientific literacy. It is both a rigorous scientific discipline and a field that studies the most complex of all phenomena: the behavioural, cognitive, and biological basis of behaviour. With this focus on behaviour, one can rightly argue that psychology resides at the hub or core of numerous other scientific disciplines; it also shares connections with neuroscience, education, and public health, to name a few linkages. From this perspective, the knowledge acquired by studying psychological science should transfer and apply to many other fields. This is great news when you consider that psychology is one of few science courses that many undergraduates will ever take.

To make scientific literacy the core of our text and MyPsychLab, we developed content and features with the model shown in the graphic as a guide. The competencies that surround the scientific literacy core represent different knowledge or skill sets we want to work toward during the course. The multidirectional nature of the arrows connecting the four supporting themes for scientific literacy demonstrates the interrelatedness of the competencies, which span both core-level skills, such as knowing general information (e.g., terms, concepts), and more advanced skills, such as knowing how to explain phenomena from a scientific perspective, critical thinking, and application of material.

We used this model in developing all aspects of this program, the topics included in the book, the execution of the writing, the learning objectives we established, the quizzes, and other features. We believe a scientific literacy perspective and model will prove useful in addressing two course needs we often hear from instructors—to provide students with a systematic way to categorize the overwhelming amount of information they are confronted with, and to cultivate their curiosity and help them understand the relevance, practicality, and immense appeal of psychological science.



We thank the many instructors and students who have helped us craft this model and apply it to our discipline, and we look forward to your feedback. Please feel free to contact us and share your experiences with the Canadian edition of *An Introduction to Psychological Science*.

Mark Krause
krausema@sou.edu

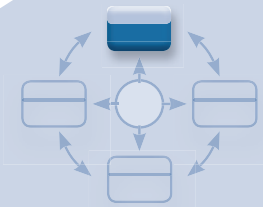
Dan Corts
danielcorts@augustana.edu

Stephen Smith
s.smith@uwinnipeg.ca

Dan Dolderman
doldermanuoft@gmail.com

Content and Features

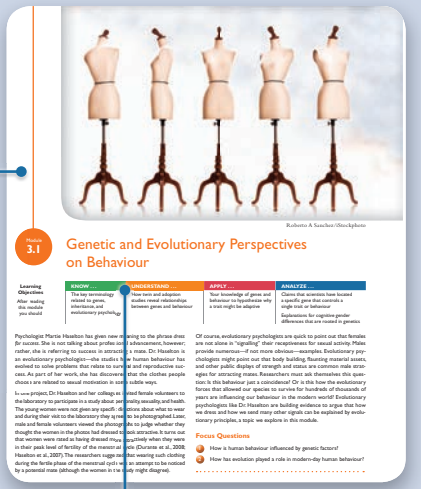
Students in the general psychology course are inundated with many disparate pieces of information at a time when they are still developing the skills and strategies for organizing and making sense of that information. How do the scientific literacy model and supporting features in *An Introduction to Psychological Science* address this issue?



Knowledge Gathering

What do we know about this?

Introductory psychology courses cover a vast amount of content drawn from diverse specialty areas. The organization of the material is central to helping students absorb this content.



Module 3.1

Genetic and Evolutionary Perspectives on Behaviour

Learning Objectives

KNOW ... | UNDERSTAND ... | APPLY ... | ANALYZE ...

Psychologist Martie Haselton has given new meaning to the phrase dress for success. She is not talking about profes[illegible] advancement, however; rather, she is referring to success in attracti[illegible] a mate. Dr. Haselton is an evolutionary psychologist—she studies h[illegible] human behaviour has evolved to solve problems that relate to surv[illegible] and reproductive success. As part of her work, she has discovere[illegible] that the clothes people choose s are related to sexual motivation in som[illegible] subtle ways.

In one project, Dr. Haselton and her colleag[illegible] tested female volunteers to the laboratory to participate in a study about per[illegible]nality, sexuality, and health. The young women were not given any specific di[illegible]ctions about what to wear and during their visit to the laboratory they were no[illegible] to be photographed. Later, male and female volunteers viewed the photogra[illegible]hs to judge whether they thought the women in the photos had dressed to [illegible] attractive. It turns out that women were rated as having dressed more [illegible]sexily when they were in their peak level of fertility of the menstrual [illegible]cle (Durante et al., 2008; Haselton et al., 2007). The researchers suggested that wearing such clothing during the fertile phase of the menstrual cycle [illegible] an attempt to be noticed by a potential mate (although the women in the study might disagree).

Of course, evolutionary psychologists are quick to point out that females are not alone in "signalling" their receptiveness for sexual activity. Males provide numerous—if not more obvious—examples. Evolutionary psychologists might point out that body building, flaunting material assets, and other public displays of strength and status are common male strategies for attracting mates. Researchers must ask themselves this question: Is this behaviour just a coincidence? Or is this how the evolutionary forces that allowed our species to survive for hundreds of thousands of years are influencing our behaviour in the modern world? Evolutionary psychologists like Dr. Haselton are building evidence to argue that how we dress and how we send many other signals can be explained by evolutionary principles, a topic we explore in this module.

Focus Questions

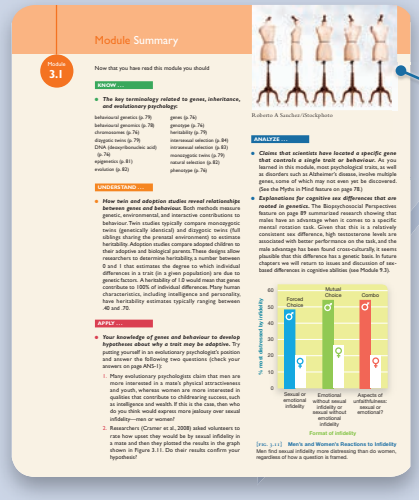
- How is human behaviour influenced by genetic factors?
- How has evolution played a role in modern-day human behaviour?

Modules

Chapters are divided into modules to make it easier for students to organize content as well as to self-test and review their learning at regular intervals. It also transforms lengthy chapters into nice "bite-sized" chunks of information that students can read in a single sitting (e.g., between classes). For instructors, the modular content makes it easy to customize delivery based on their preferred syllabus.

Learning Objectives

Learning Objectives organized around an updated Bloom's taxonomy aim to guide students to higher-level understanding. Summaries of the key points related to these objectives are provided at the end of each module. Objectives are listed at four levels of increasing complexity: know, understand, apply, and analyze.



Module Summary

Module 3.1

Now that you have read this module you should

KNOW ...

- **The key terminology related to genes, inheritance, and evolutionary psychology:**

behavioural genetics (p. 79) | genes (p. 76)
behavioural genomics (p. 78) | genotype (p. 76)
chromosomes (p. 76) | heritability (p. 79)
diagnostic twins (p. 79) | intersexual selection (p. 84)
DNA (deoxyribonucleic acid) (p. 76) | intrasexual selection (p. 83)
epigenetics (p. 81) | monozygotic twins (p. 79)
evolution (p. 82) | natural selection (p. 82)
| phenotype (p. 76)

UNDERSTAND ...

- **How twin and adoption studies reveal relationships between genes and behaviour.** Both methods measure genetic, environmental, and interactive contributions to behaviour. Twin studies typically compare monozygotic twins (genetically identical) and dizygotic twins (full siblings sharing the prenatal environment) to estimate heritability. Adoption studies compare adopted children to their adoptive and biological parents. These designs allow researchers to determine heritability, a number between 0 and 1 that estimates the degree to which individual differences in a trait (in a given population) are due to genetic factors. A heritability of 1.0 would mean that genes contribute to 100% of individual difference. Many human characteristics, including intelligence and personality, have heritability estimates typically ranging between .40 and .70.

APPLY ...

- ***Your knowledge of genes and behaviour to develop hypotheses about why a trait may be adaptive.*** Try putting yourself in an evolutionary psychologist's position and answer the following two questions (check your answers on page ANS-1):

1. Many evolutionary psychologists claim that men are more interested in a mate's physical attractiveness and youth, whereas women are more interested in qualities that contribute to childrearing success, such as intelligence and wealth. If this is the case, then who do you think would express more jealousy over sexual infidelity—men or women?
2. Researchers (Cramer et al., 2008) asked volunteers to rate how upset they would be by sexual infidelity in a mate and then they plotted the results in the graph shown in Figure 3.11. Do their results confirm your hypothesis?

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ANALYZE ...

- **Claims that scientists have located a specific gene that controls a single trait or behaviour.** As you learned in this module, most psychological traits, as well as disorders such as Alzheimer's disease, involve multiple genes, some of which may not even yet be discovered. (See the Myths in Mind feature on page 78.)
- **Explanations for cognitive sex differences that are rooted in genetics.** The Biopsychosocial Perspectives feature on page 89 summarized research showing that males have an advantage when it comes to a specific mental rotation task. Given that this is a relatively consistent sex difference, high testosterone levels are associated with better performance on the task, and the male advantage has been found cross-culturally, it seems plausible that this difference has a genetic basis. In future chapters we will return to issues and discussion of sex-based differences in cognitive abilities (see Module 9.3).

[FIG. 3.11] **Men's and Women's Reactions to Infidelity**
Men find sexual infidelity more distressing than do women, regardless of how a question is framed.

Module Summaries

The major terms, concepts, and applications of the modules are reviewed in the Module Summaries. The summaries also return to and address the original Learning Objectives from the beginning of the module and include application questions (with answers in the back of the book).

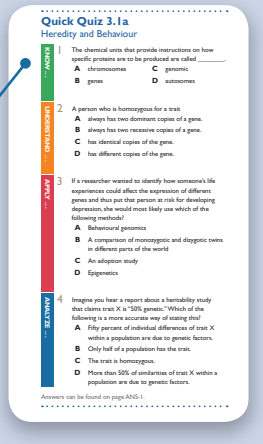
Another major set of forebrain structures comprises the **limbic system**, *an integrated network involved in emotion and memory* (Maclean, 1952; see Figure 3.25). One key structure in the limbic system is the **amygdala**, *which facilitates memory formation for emotional events, mediates fear responses, and appears to play a role in recognizing and interpreting emotional stimuli, including facial expressions.* In addition, the amygdala connects with structures in the nervous system that are

Key Terms

Key Terms are defined within the narrative, helping students place them in context, and are then listed again within the Module Summaries. A complete glossary is also included at the end of the text.

Quick Quizzes

Quizzes appear at the conclusion of major sections of the module (typically two to four quizzes per module). These quizzes contain multiple-choice questions that enable students to assess their comprehension and better prepare for exams. Like the Learning Objectives, the Quick Quizzes assess understanding at the four levels of Bloom's taxonomy and are marked accordingly.



Quick Quiz 3.1a
Heredity and Behaviour

KNOW...
1 The chemical units that provide instructions on how specific proteins are to be produced are called _____.
A chromosomes C genomic
B genes D sutosomes

UNDERSTAND...
2 A person who is homozygous for a trait
A always has two dominant copies of a gene.
B always has two recessive copies of a gene.
C has identical copies of the gene.
D has different copies of the gene.

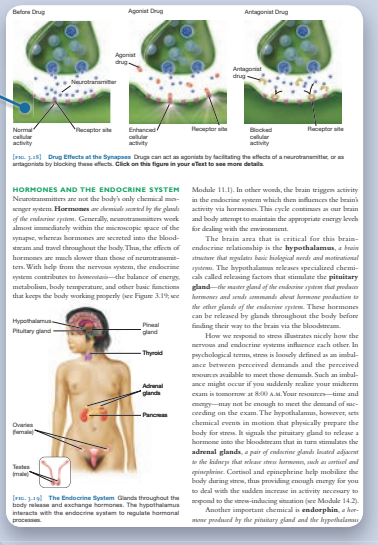
APPLY...
3 If a researcher wanted to identify how someone's life experiences could affect the expression of different genes and thus put that person at risk for developing depression, she would most likely use which of the following methods?
A Behavioural genomics
B A comparison of monozygotic and dizygotic twins in different parts of the world
C An adoption study
D Epigenetics

ANALYZE...
4 Imagine you hear a report about a heritability study that claims trait X is "50% genetic." Which of the following is a more accurate way of stating this?
A Fifty percent of individual differences of trait X within a population are due to genetic factors.
B Only half of a population has the trait.
C The trait is homozygous.
D More than 50% of similarities of trait X within a population are due to genetic factors.

Answers can be found on page ANS-1.

Active Illustration

For key figures and illustrations, animations are provided within the eText to deliver greater clarity and understanding. For example, readers are much more apt to understand the structures of the brain when they can click on a diagram of it and see a fully rotating illustration. The Pearson eText for the Canadian edition of *An Introduction to Psychological Science* is designed with alternative delivery models in mind. Highly visual, clearly laid out, and with integrated video and media, it is optimal for online reading and interaction. Students can access their textbook anytime, anywhere, and any way they want, including listening online or downloading it to their iPads.



[FIG. 3.18] **Drug Effects at the Synapses** Drugs can act as agonists by facilitating the effects of a neurotransmitter, or as antagonists by blocking these effects. **Click on this figure in your eText to see more details.**

HORMONES AND THE ENDOCRINE SYSTEM

Neurotransmitters are not the body's only chemical messenger system. **Hormones** *are chemicals secreted by the glands of the endocrine system.* Generally, neurotransmitters work almost immediately within the microscopic space of the synapse, whereas hormones are secreted into the bloodstream and travel throughout the body. Thus, the effects of hormones are much slower than those of neurotransmitters. With help from the nervous system, the endocrine system contributes to homeostasis—the balance of energy, metabolism, body temperature, and other basic functions that keeps the body working properly (see Figure 3.19; see Module 11.1). In other words, the brain triggers activity in the endocrine system which then influences the brain's activity via hormones. This cycle continues as our brain and body attempt to maintain the appropriate energy levels for dealing with the environment.

[FIG. 3.19] **The Endocrine System** Glands throughout the body release and exchange hormones. The hypothalamus interacts with the endocrine system to regulate hormonal processes.

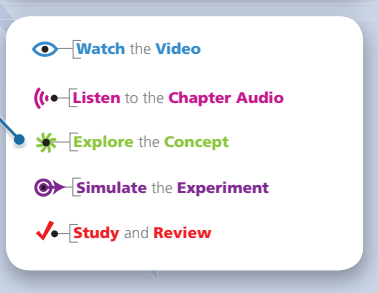
The brain area that is critical for this brain-endocrine relationship is the **hypothalamus**, *a brain structure that regulates basic biological needs and motivational systems.* The hypothalamus releases specialized chemicals called releasing factors that stimulate the **pituitary gland**—*the master gland of the endocrine system that produces hormones and sends commands about hormone production to the other glands of the endocrine system.* These hormones can be released by glands throughout the body before finding their way to the brain via the bloodstream.

How we respond to stress illustrates nicely how the nervous and endocrine systems influence each other. In psychological terms, stress is loosely defined as an imbalance between perceived demands and the perceived resources available to meet those demands. Such an imbalance might occur if you suddenly realize your midterm exam is tomorrow at 8:00 A.M. Your resources—time and energy—may not be enough to meet the demand of succeeding on the exam. The hypothalamus, however, sets chemical events in motion that physically prepare the body for stress. It signals the pituitary gland to release a hormone into the bloodstream that in turn stimulates the **adrenal glands**, *a pair of endocrine glands located adjacent to the kidneys that release stress hormones, such as cortisol and epinephrine.* Cortisol and epinephrine help mobilize the body during stress, thus providing enough energy for you to deal with the sudden increase in activity necessary to respond to the stress-inducing situation (see Module 14.2).

Another important chemical is **endorphin**, *a hormone produced by the pituitary gland and the hypothalamus*

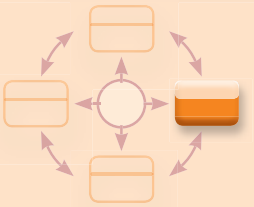
MyPsychLab

MyPsychLab icons in the margin call out important information students can access online—for example, videos, simulations, and hands-on experiments.



Scientific Explanation

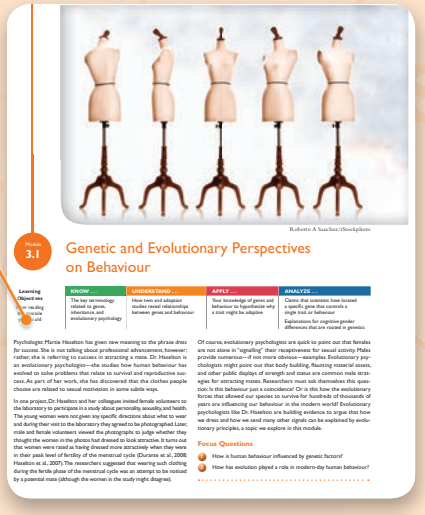
How can science explain it?



This element of scientific literacy encompasses a basic understanding of research methodology and thinking about problems within a scientific framework. *An Introduction to Psychological Science* integrates and reinforces key research methodology concepts throughout the book. This interweaving of methodology encourages students to continue practising their scientific thinking skills. Learning science is more than accumulating facts; students learn to ask questions, construct explanations, test those explanations, and communicate their ideas to others.

Module Opening Vignettes

Each module opens with a short vignette emphasizing the personal and societal relevance of certain topics to be covered. The vignette concludes with Focus Questions preparing the reader to think about the content found within the module.



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Module 3.1

Genetic and Evolutionary Perspectives on Behaviour

Learning Objectives

KNOW …	UNDERSTAND …	APPLY …	ANALYZE …
The key terminology related to genes, inheritance, and evolutionary psychology	How twin and adoption studies reveal relationships between genes and behaviour	Your knowledge of genes and behaviour to hypothesize why a trait might be adaptive	Claims that scientists have located a specific gene that controls a single trait or behaviour Explanations for cognitive gender differences that are rooted in genetics

Psychologist Marnie Hawkton has given new meaning to the phrase *dress for success*. She is not talking about professional advancement, however; rather, she is referring to success in attracting a mate. Dr. Hawkton is an evolutionary psychologist—she studies how human behaviour has evolved to solve problems that relate to survival and reproductive success. As part of her work, she has discovered that the clothes people choose are related to sexual motivation in some subtle ways.

In one project, Dr. Hawkton and her colleagues invited female volunteers to the laboratory to participate in a study about personality, sexuality, and health. The young women were not given any specific directions about what to wear and during their visit to the laboratory they agreed to be photographed. Later, male and female volunteers viewed the photographs to judge whether they thought the women in the photos had dressed to look attractive. It turns out that women were rated as having dressed more attractively when they were in their peak level of fertility of the menstrual cycle (Durante et al., 2008; Hawkton et al., 2007). The researchers suggested that wearing such clothing during the fertile phase of the menstrual cycle was an attempt to be noticed by a potential mate (although the women in the study might disagree).

Of course, evolutionary psychologists are quick to point out that females are not alone in "signalling" their receptiveness for sexual activity. Males provide numerous—if not more obvious—examples. Evolutionary psychologists might point out that body building, flaunting material assets, and other public displays of strength and status are common male strategies for attracting mates. Researchers must ask themselves this question: Is this behaviour just a coincidence? Or is this how the evolutionary forces that allowed our species to survive for hundreds of thousands of years are influencing our behaviour in the modern world? Evolutionary psychologists like Dr. Hawkton are building evidence to argue that how we dress and how we send many other signals can be explained by evolutionary principles, a topic we explore in this module.

Focus Questions

- How is human behaviour influenced by genetic factors?
- How has evolution played a role in modern-day human behaviour?

Biopsychosocial Perspectives

To emphasize the complexity of scientific explanations, students are reminded throughout each chapter that behaviour includes biology, individual thoughts and experiences, and the influence of social and cultural factors.

BIOPSYCHOSOCIAL PERSPECTIVES

Hunters and Gatherers: Men, Women, and Spatial Memory

Evolutionary psychologists claim that the brain consists of a set of cognitive adaptations for solving problems related to survival and reproductive fitness. They also hypothesize that male and female brains will differ in some ways because males and females have had to solve a different set of problems in order to survive and reproduce. Specifically, due to their size and strength, males were traditionally responsible for tracking and killing animals. These responsibilities would require males to travel over long distances without becoming lost. Females, due to the fact that they cared for children, remained closer to home and instead spent time foraging for berries and edible plants. Males' responsibilities would favour individuals with good spatial skills; females' responsibilities would favour memory for the location of objects (e.g., plants). The question, then, is whether the abilities that were adaptive for males and females over the course of our species' evolution are still present today. Put another way, will modern males and females show performance differences on different tests of spatial abilities that are consistent with their historic roles as hunter (males) and gatherer (females)?

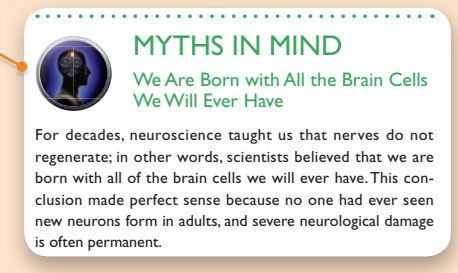
One sex difference that has been reported involves solving the mental rotation task seen in Figure 3.9.

Instructions

1. Take a close look at standard object #1 in Figure 3.9. One of the three objects to the right of it is the same. Which one matches the standard? Repeat this with standard object #2 and the three comparison shapes to the right of it.
2. Many researchers find that, on average, males and females differ in their ability to perform this task. Do you think that

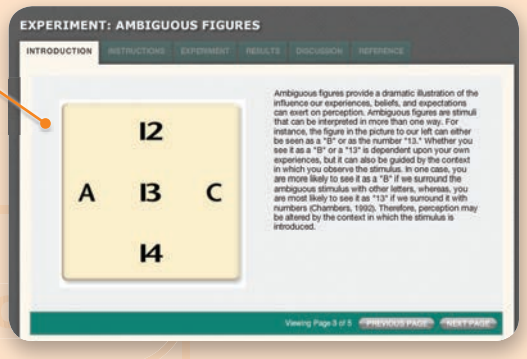
Myths in Mind

Many commonly held beliefs people have about behaviour before taking a psychology course are half-truths or outright falsehoods. This feature sets the record straight in a concise and informative way. The selected examples are likely to have personal relevance to many readers and deal with important scientific issues.



MyPsychLab Simulations

MyPsychLab Simulations allow students to participate in experiments online to reinforce what they are learning in class and in their book. More than 50 experiments, surveys, and inventories are available through this online tool (available at MyPsychLab).

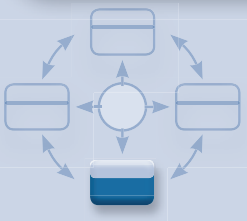


How can science explain it?

In recent years, an increasing number of instructors have begun to focus on telling students how psychological science fits within the scientific community. Psychology serves, in essence, as a hub science. Through this emphasis on scientific literacy in psychology, students begin to see the practicality and relevance of psychology and become more literate in the fields that our hub science supports.

Critical Thinking

Can we critically evaluate the evidence?



Many departments are focusing to an increasing extent on the development of critical thinking, as these skills are highly sought after in society and the workforce. Critical thinking is generally defined as the ability to apply knowledge, use information in new ways, analyze situations and concepts, and evaluate decisions. To develop critical thinking, the module objectives and quizzes are built around an updated Bloom's taxonomy. Objectives are listed at four levels of increasing complexity: know, understand, apply, and **analyze**. The following features also help students organize, analyze, and synthesize information. Collectively, these features encourage students to connect different levels of understanding with specific objectives and quiz questions.

Working the Scientific Literacy Model

Working the Scientific Literacy Model, introduced in Chapter 1, and then featured in each module in the remaining chapters, fully integrates the model of scientific literacy. Core concepts are highlighted and students are walked through the steps of knowledge gathering, approaching the problem from a scientific standpoint, using critical thinking, and revealing applications.

WORKING THE SCIENTIFIC LITERACY MODEL
Pain and Substance P

Pain is not a simple process. Instead, there are a number of different neural systems and neurotransmitters involved with our responses to painful stimuli (see Module 4.4). In fact, serotonin, norepinephrine, and dopamine have all been implicated in some part of the pain response. One neurotransmitter that hasn't been discussed yet, however, is known as **Substance P**, *a neurotransmitter involved in the experience of pain.*

What do we know about Substance P?

Substance P was first discovered in 1931 when a paste made from the brain and intestine of a horse was found to cause muscles to contract (Von Euler & Gaddum, 1931) that was one heck of a party fo was named Substance P because the paste became powdery (Goddum & Schild, 1954). Twenty years later, Austrian physiologist Fred Lembeck determined that this substance was associated with the transmission of pain (Harrison & Geppetti, 2001; Lembeck, 1953). Lembeck and others noted that Substance P was found in the dorsal root of the spinal cord, an area that transmits pain information back to the brain (Otsuka et al., 1972), as well as in several different brain areas related to the pain response (Mantyh, 2002). So, when tissue on the skin surface is damaged, sensory nerves carry messages to the spinal cord and then up to the brain. In turn, these CNS structures release Substance P, giving rise to the perception of pain.

How can science explain what Substance P does?

From an evolutionary standpoint, it makes sense to have pathways specialized for the perception of pain. Pain is an important messenger telling you to stop doing something that is harming your body. Compelling evidence for the role of Substance P comes from an examination of the brain areas containing Substance P receptors. These receptors are densely packed in a structure in the middle of the brain called the periaqueductal grey (Tölg & Chahl, 2001). This brain region receives pain- and temperature-related input from the spinal cord and sends it to different areas of the cerebral cortex, the wrinkled outer surface of the brain involved with many sophisticated processes. It also receives input from the cortex and transmits it through the spinal cord to the rest of the body. The fact that a neural area known to be associated with pain perception also contains receptors for Substance P suggests that this neurotransmitter is likely involved with pain responses.

However, this is not the only part of the brain containing Substance P receptors. They are also found in the amygdala (which responds to fear and arousal) and the hypothalamus (which is related to fight-or-flight responses and the release of different hormones). Why would this be the case? One possibility is that pain is not simply a physical sensation. A large body of research now suggests that when we feel pain, it is a combination of both sensation and an emotional response. Sometimes the tears that fall after we stub our toe are due not only to being hurt, but to being frustrated (among many other emotions).

Can we critically evaluate this research?

Evidence in favour of the role of Substance P in pain perception comes from a group of patients with a rare condition called congenital insensitivity to pain. These individuals lack the ability to perceive pain, and even in early childhood acquire significant damage to the skin, joints, eyes, and other body regions. Because they lack a pain response, these individuals do not take action to prevent physical damage to the body. Research in the U.K. (ironically conducted by someone named Dr. Maury) found that some individuals with this disorder lack Substance P receptors in the peripheral nerves (Maury et al., 1999). Studies such as this provide strong evidence for this neurotransmitter's role in pain perception.

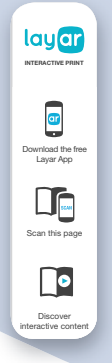
More contentious is the issue of pain and emotion. There is a great deal of evidence linking emotion and pain. For instance, social "pain" resulting from being rejected activates similar brain areas as physical pain (Eisenberger, 2012; Eisenberger et al., 2003). There is also evidence that patients with chronic pain conditions are also more likely to suffer from depression (Dunne & Dunne, 2012). Interestingly, some investigators have found that drugs that influence the levels of Substance P in the brain have antidepressant properties (Adell, 2004). However, these researchers are quick to note that such drugs could also potentially influence other neurotransmitter systems. Therefore, more research is needed to clarify this issue.

Why is this relevant?

Millions of people suffer from chronic pain. In addition to compromising the well-being

Work the Scientific Literacy Model

At the end of every chapter, students have an opportunity to "Work the Scientific Literacy Model" themselves. The Work the Model feature walks students through content from the chapter, providing study tips and reminders for key content areas. Students are asked to critically evaluate what they have learned by accessing a video clip, either through MyPsychLab, the Layar app, the QR code on the page, or YouTube. They are then provided with a question prompting them to apply relevant content to the scenario depicted in the video. These questions can be assigned as either a classroom discussion or a writing assignment.



Work the Scientific Literacy Model :: Understanding Brain Functions

1 What do we know about structures of the brain?

See **Table 3.2** for a list of the major brain regions, structures, and their functions. As you review this material, try to come up with strategies to distinguish these terms. For example, two brain structures commonly confused with each other are the hypothalamus and the hippocampus. Although the hypothalamus and the hippocampus are both part of the limbic system, they have very different functions. The hypothalamus serves as a sort of thermostat, maintaining the appropriate body temperature, and it can affect drives such as aggression and sex. The hippocampus is critical for learning and memory, particularly the formation of new memories. Can you think of a memory device that might help you keep these two brain structures separate? One suggestion: For the hippocampus, think of the last part of the word—"campus." To successfully navigate your university's campus, you need to keep in mind where certain buildings are located. This area is exactly the type of task that involves a functioning hippocampus. As you study, try to come up with your own memory devices to help recall the different brain structures and their functions.

2 How can science help explain brain structure and function?

As discussed on **page 121**, in the very early days of brain research, scientists had to rely almost exclusively on case studies to gather data. There was no way to image the brain of a living, breathing patient or research participant. Today, through neuroimaging technology, researchers are able to take detailed pictures of the brain and can examine the actual activity of major structures such as the hypothalamus and the hippocampus while that activity is occurring. Researchers have developed a variety of methods for studying the brain, each of which offers some advantage over the others. See **pages 121–125** for detailed descriptions of methods for measuring and observing brain activity: electroencephalogram (EEG), positron emission tomography (PET) scan, magnetic resonance imaging (MRI), functional MRI (fMRI), magnetoencephalography (MEG), brain lesioning, and transcranial magnetic stimulation (TMS).

Sebastian Kaulitzki / Shutterstock

3 Can we critically evaluate claims about brain function?

Modern methods have helped us understand a great deal about brain structures and functions, but many misunderstandings persist. In **Myths in Mind on page 95**, we addressed the question of whether humans are born with all of the nerve cells we will ever have. In the past 15 years or so, advances in brain science have challenged this traditionally held belief. Researchers have observed neurogenesis in a limited number of brain regions, particularly in the hippocampus. Some areas within the hippocampus have the capacity to generate new cells long after birth.

Also, in our discussion of hemispheric specialization on **page 115**, we discussed how the degree to which people are "right-brained" or "left-brained" is often exaggerated in the popular media. Creative artists are often described as "right-brained," whereas logical and analytical types are supposedly "left-brained." In reality, most cognitive functions are spread throughout multiple brain regions.

It is easy to get caught up in thinking about these kinds of generalities as absolutes. Whenever you encounter "scientific claims" in the popular media, it is important to properly evaluate the information before embracing it as truth.

4 Why is this relevant?

Watch the accompanying video excerpt on brain functions. You can access the video in MyPsychLab or by clicking the play button in the centre of your eText. If your instructor assigns this video as a homework activity you will find additional content to help you in MyPsychLab. You can also view the video by using your smart phone and the QR code below, or you can go to the YouTube link provided.

After you have read this chapter and watched the video, imagine that your best friends invite you over for pizza and a friendly game of cards. Describe how the following parts of the brain are involved during your evening of eating pizza, socializing, and playing cards: Broca's area, hippocampus, hypothalamus, and occipital lobe.

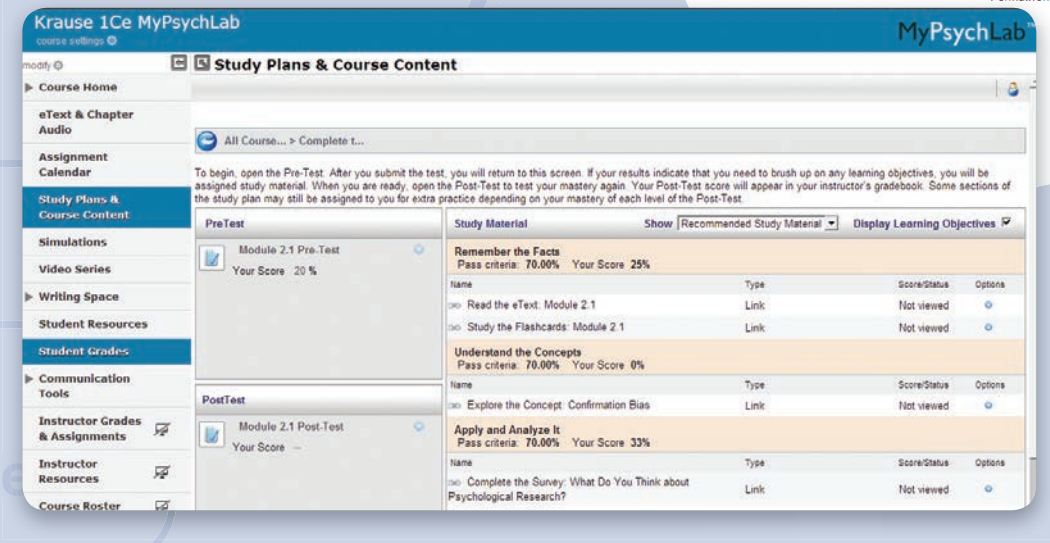
MyPsychLab **Your turn to Work the Scientific Literacy Model:** Watch the accompanying video on YouTube, or on your phone (using the Layar app or QR code). If your instructor has assigned this as a homework activity, you can find the video clip and additional content at MyPsychLab. Answer the questions that accompany the video clip to test your understanding.

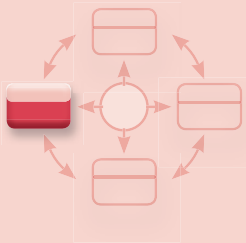
YouTube youtube.com/workthemodel

SCAN WITH LAYAR

Study Plan

Through MyPsychLab (www.pearsonmylabmastering.com), students have access to a *personalized study plan*, based on Bloom's taxonomy, that arranges content from basic level thinking (such as remembering and understanding) to more complex critical thinking (such as applying and analyzing). This layered approach sharpens critical thinking skills, and helps students succeed in the course and beyond.

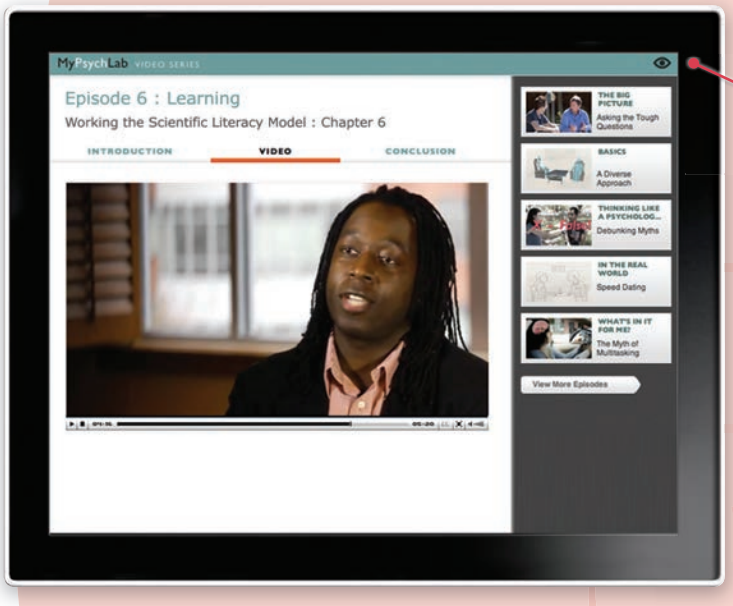




Application

Why is this relevant?

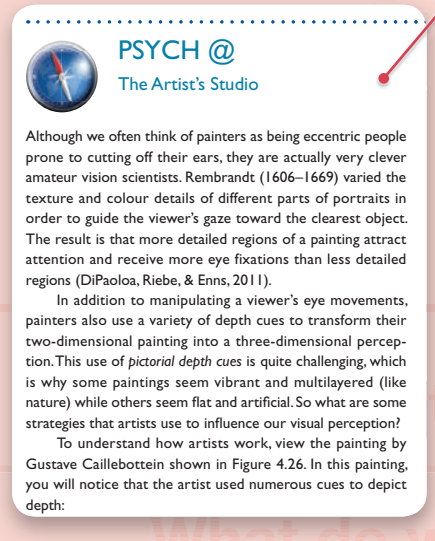
Psychology is a highly relevant, modern science. To be scientifically literate, students should relate psychological concepts to their own lives, making decisions based on knowledge, sound methodology, and skilled interpretation of information.



MyPsychLab Video Series

Links are provided throughout the eText to relevant episodes of the MyPsychLab Video series—a comprehensive, current, and cutting-edge series featuring 17 original 30-minute videos covering the most recent research, science, and applications and utilizing the most up-to-date film and animation technology.

Why is this relevant?



PSYCH @

The Artist's Studio

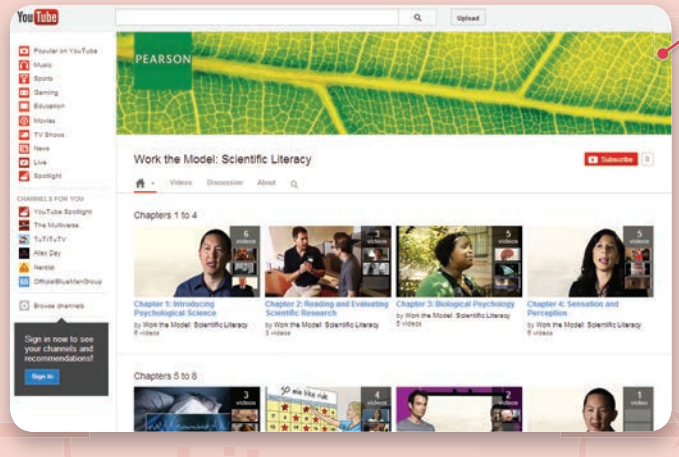
Although we often think of painters as being eccentric people prone to cutting off their ears, they are actually very clever amateur vision scientists. Rembrandt (1606–1669) varied the texture and colour details of different parts of portraits in order to guide the viewer's gaze toward the clearest object. The result is that more detailed regions of a painting attract attention and receive more eye fixations than less detailed regions (DiPaoloa, Riebe, & Enns, 2011).

In addition to manipulating a viewer's eye movements, painters also use a variety of depth cues to transform their two-dimensional painting into a three-dimensional perception. This use of *pictorial depth cues* is quite challenging, which is why some paintings seem vibrant and multilayered (like nature) while others seem flat and artificial. So what are some strategies that artists use to influence our visual perception?

To understand how artists work, view the painting by Gustave Caillebottein shown in Figure 4.26. In this painting, you will notice that the artist used numerous cues to depict depth:

Psych @

The "Psych @" feature reveals an everyday, personally relevant application of psychological science. The content of these features is geared toward issues and concerns that many university students care about.



YouTube Scientific Literacy Site

YouTube has become one of the most popular social media resources for both instructors and students. The challenge, of course, is to find clips that are relevant to key content areas. To help instructors access valuable open-source content and further bring to light the relevance of the discipline of psychology, a YouTube channel, found at

www.youtube.com/workthemodel

has been developed to accompany *An Introduction to Psychological Science*. The book provides relevant video links for instructor and student access, in addition to the videos that frame the end-of-chapter "Work the Scientific Literacy Model" activity.

What's New in the Canadian Edition?

When we started writing the Canadian edition of this textbook, we assumed we'd just add the letter "u" a few hundred times and insert some pictures of Sidney Crosby. We did add several thousand u's and one photo of Crosby—but, as we began to write the different chapters, we became amazed at how important Canadian researchers have been to the study of psychological science. In boxing, there is the phrase "punching above your weight." It is used when a smaller fighter's punches feel like they are coming from a larger, stronger fighter. Canadian psychology is like that. Despite the fact that we are a relatively small country (in terms of population and the number of research institutions), we have made incredibly important contributions to a number of areas of psychology. The work of Canadian researchers served as the foundation for many areas of neuroscience, perception, memory, social, and health research. So, although we rewrote large chunks of the book, the Canadian content isn't just added as a bonus. The Canadian content is actually an essential part of psychological science *in general.* As a result, we ended up adding over 1400 *new* references to the U.S. edition of this book. These include the following additions:

- highlighting the importance that Canadian research has had on the development of modern psychology;
- adding research conducted by Canadian researchers from all 10 provinces;
- incorporating research related to cultural psychology and the experiences of first- and second-generation immigrants to Canada;
- discussing bilingualism and its effects on culture, cognition, and the brain;
- providing a thorough discussion of Canadian legal decisions (including references to specific Supreme Court rulings) related to issues such as sexting, hypnosis, and recovered memories;
- discussing Canadian statistics and laws related to drug use and possession;
- providing Statistics Canada and Health Canada materials for a number of topics including smoking, obesity, work stress, gambling, and clinical conditions;
- clarifying the ethical requirements for conducting research at Canadian universities and hospitals;
- incorporating discussions of social issues that are central to many Canadians' lives such as environmental issues, the increased role of technology in our lives, and the influence that marketers and corporations try to have over us all.

We have also made an effort to make psychology less "abstract" than it is often portrayed in textbooks. Throughout this book, we use examples from the real world in order to demonstrate that the concepts the students are learning about affect *their own* behaviour. Although we include some traditional examples such as how to improve study habits, we go beyond that. For example, we use the concepts learned in different chapters to highlight tricks used by advertisers (including those used in negative political advertising). We also point out interesting things to look for in social interactions, such as the tendency of heterosexual males to stand up straighter in the presence of women in order to appear more powerful (discussed in Evolutionary Insights into Human Behaviour in Module 3.1). Our hope is that these engaging examples will allow the students to see the world in a slightly different way.

In addition to these examples, *we also try to show the students how they can use psychology to change the world that they live in.* An example found in many chapters is that of changing people's environmental behaviours and their attitudes toward issues such as climate change. Our hope is that by seeing how psychological science can be used to change behaviours for the better, students will be motivated to take the information from this book outside of the classroom to create the types of changes that our world desperately needs.

When you begin any course, it is like starting a journey. We hope you enjoy your journey through the Canadian edition of *An Introduction to Psychological Science* as much as we enjoyed writing it.

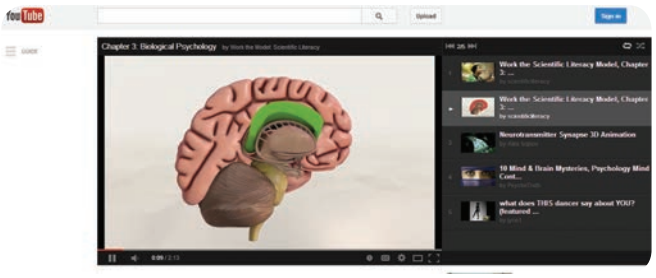
For Instructors

SCIENTIFIC LITERACY is a key course goal for many introductory psychology instructors.

Learning science is an active process. How do we help instructors model scientific literacy in the classroom and online in a way that meets the needs of today's students?

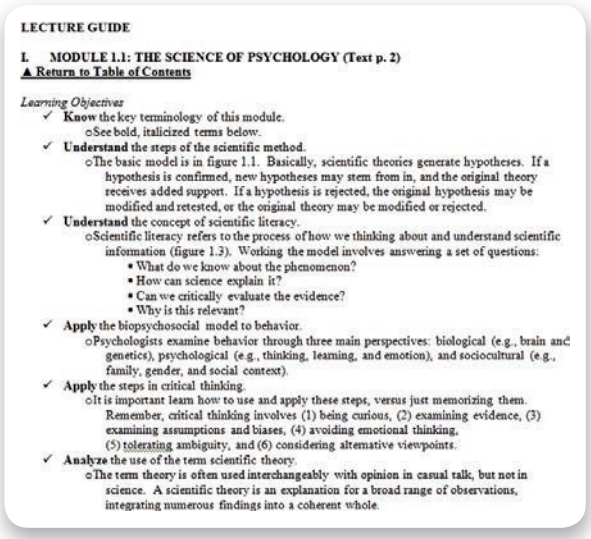
ORGANIZATION

Instructors consistently tell us one of the main challenges they face when teaching the introductory psychology course is organizing engaging, current, and relevant materials to span the breadth of content covered. How do we help organize and access valuable course materials?



YouTube Scientific Literacy Site

As mentioned earlier, a YouTube channel, found at www.youtube.com/workthemodel, provides a wealth of videos to help engage students and enhance their learning. The ready access provided to these videos, with content spanning the breadth of psychological science, means that instructors no longer have to search for just the right video links to material that meshes with the text's content.



LECTURE GUIDE

I. MODULE 1.1: THE SCIENCE OF PSYCHOLOGY (Text p. 2)
▲ Return to Table of Contents

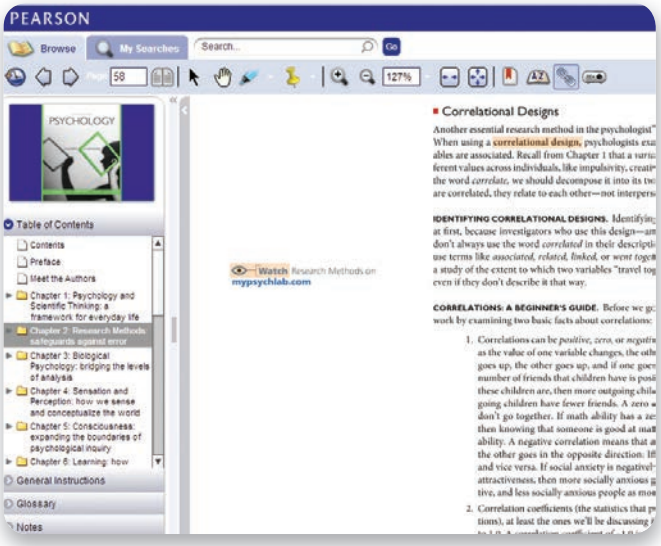
Learning Objectives

- ✓ **Know** the key terminology of this module.
  - ○See bold, italicized terms below.
- ✓ **Understand** the steps of the scientific method.
  - ○The basic model is in figure 1.1. Basically, scientific theories generate hypotheses. If a hypothesis is confirmed, new hypotheses may stem from in, and the original theory receives added support. If a hypothesis is rejected, the original hypothesis may be modified and retested, or the original theory may be modified or rejected.
- ✓ **Understand** the concept of scientific literacy.
  - ○Scientific literacy refers to the process of how we thinking about and understand scientific information (figure 1.3). Working the model involves answering a set of questions:
    - What do we know about the phenomenon?
    - How can science explain it?
    - Can we critically evaluate the evidence?
    - Why is this relevant?
- ✓ **Apply** the biopsychosocial model to behavior.
  - ○Psychologists examine behavior through three main perspectives: biological (e.g., brain and genetics), psychological (e.g., thinking, learning, and emotion), and sociocultural (e.g., family, gender, and social context).
- ✓ **Apply** the steps in critical thinking.
  - ○It is important learn how to use and apply these steps, versus just memorizing them. Remember, critical thinking involves (1) being curious, (2) examining evidence, (3) examining assumptions and biases, (4) avoiding emotional thinking, (5) tolerating ambiguity, and (6) considering alternative viewpoints.
- ✓ **Analyze** the use of the term scientific theory.
  - ○The term theory is often used interchangeably with opinion in casual talk, but not in science. A scientific theory is an explanation for a broad range of observations, integrating numerous findings into a coherent whole.

Instructor's Resource Manual

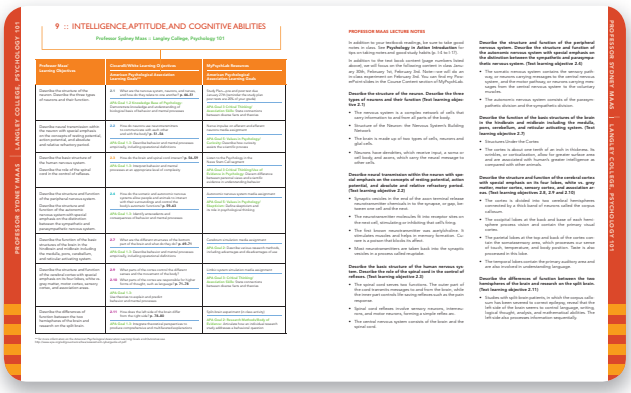
The Instructor's Resource Manual includes suggestions for preparing for the course, sample syllabi, and current trends and strategies for successful teaching. Each chapter offers integrated teaching outlines, lists the key terms for each chapter for quick reference, and provides an extensive bank of lecture launchers, handouts, and activities, as well as suggestions for integrating third-party videos and web resources. This resource saves prep work and helps professors use their classroom time more efficiently.

ORGANIZATION



Pearson eText

The Canadian edition of *An Introduction to Psychological Science* is designed with alternative delivery models in mind. Highly visual, clearly laid out, and with integrated video and media, it is optimal for online reading and interaction. Instructors and students can access their textbook anytime, anywhere, and any way they want, including listening online or downloading it to an iPad.



Create a Custom Text

For courses with enrollments of at least 25 students, instructors can create their own textbook by combining chapters from best-selling Pearson textbooks or reading selections in a customized sequence. To begin building a custom text, visit

www.pearsoncustomlibrary.com

Instructors can also work with a dedicated Pearson Custom editor to create the ideal text—publishing original content or mixing and matching Pearson content. Contact a Pearson publisher's representative to get started.

PRESENTATION

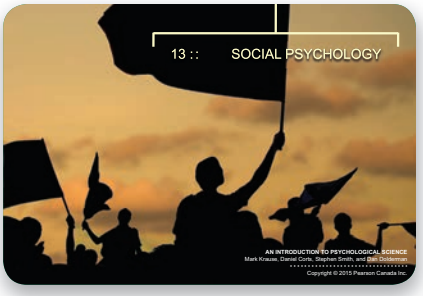
Instructors consistently tell us making their classroom lectures and online instruction exciting and dynamic is a top priority so they can engage students and bring psychology to life. We have been listening and have responded by creating state-of-the-art presentation resources, putting the most powerful presentation resources at your fingertips.

ClassPrep

Finding, sorting, organizing, and presenting instructor resources is faster and easier than ever before with ClassPrep, which is available in MyPsychLab. This fully searchable database contains hundreds of our best teacher resources, such as lecture launchers and discussion topics, in-class and out-of-class activities and assignments, handouts, and video clips, photos, illustrations, charts, graphs, and animations. Instructors can search or browse by topic, and readily sort their results by type, such as photo, document, or animation. Instructors can create personalized folders to organize and store the content that they like, or can download resources if they prefer. In addition, instructors can upload their own content and present directly from ClassPrep, or make it available online directly to their students. Also available—a ClassPrep app that allows access to all favourite resources via any mobile device.

PowerPoint Presentations

Engaging PowerPoint slides bring the powerful Krause/Corts/Smith/Dolderman design right into the classroom, drawing students into the lecture with interesting information and rich visuals. The slides are built around the learning objectives in each module and offer key material that is provided in the text. In addition, interactive presentations with "clicker" questions are provided for instructors using classroom response systems.

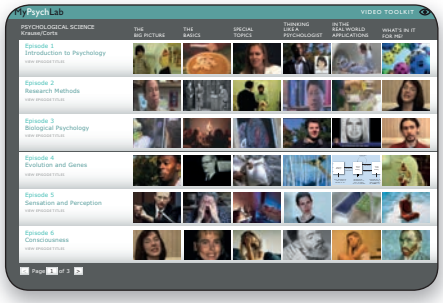


For maximum flexibility, each half-hour episode features several brief clips that bring psychology to life:

- The Big Picture introduces the topic of the episode and provides the hook to draw students fully into the topic.
- The Basics uses the power of video to present foundational topics, especially those that students find difficult to understand.
- Special Topics dives deeper into high-interest and cutting-edge topics, showing research in action.
- In the Real World focuses on applications of psychological research.
- What's in It for Me? clips show students the relevance of psychological research to their own lives.

MyPsychLab Video Series

The MyPsychLab Video series is a comprehensive, current, and cutting-edge series featuring 17 original 30-minute videos covering the most recent research, science, and applications and utilizing the most up-to-date film and animation technology. Questions are provided within MyPsychLab so that instructors can assign relevant clips from the series as homework; they may also use the series in the classroom to illustrate the many fascinating topics in the field of psychology as part of their lectures. Guided by the Design, Development, and Review team—a diverse group of introductory psychology instructors—each episode is organized around the major topics covered in the introductory psychology course syllabus. Find out more about the MyPsychLab Video Series: www.pearsonhighered.com/showcase/mypsychlab_videos/



ASSESSMENT

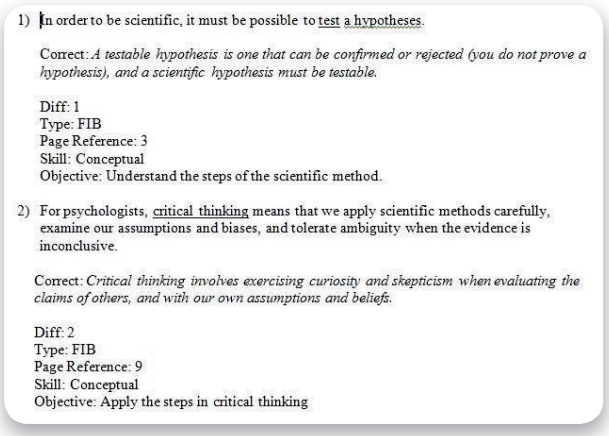
Instructors consistently tell us that assessing student progress is a critical component to their course and one of the most time-consuming tasks. Vetted, good-quality, easy-to-use assessment tools are essential. We have been listening and we have responded by creating the absolutely best assessment content available on the market today.

Test Bank

The Test Bank (Test Item File) contains more than 3000 questions, many of which were class-tested in multiple classes at both 2-year and 4-year institutions prior to publication. All questions have been thoroughly reviewed and analyzed line by line by a developmental editor and a copy editor to ensure clarity, accuracy, and delivery of the highest-quality assessment tool. All conceptual and applied multiple-choice questions include rationales for each correct answer and the key distracter, which serve both as an added guarantee of quality and as a time-saver when students challenge the keyed answer for a specific item.

In addition to this high-quality Test Bank, a second bank containing more than 2000 questions is available for instructors looking for more variation.

The Test Bank also comes with Pearson MyTest, a powerful assessment generation program that helps instructors easily create and print quizzes and exams. Questions and tests can be authored online, providing instructors with the ultimate in flexibility and the ability to efficiently manage assessments wherever and whenever they want. Instructors can easily access existing questions and then edit, create, and store them using simple drag-and-drop and Word-like controls. The data for each question identifies its difficulty level and the text page number where the relevant content appears. In addition, each question maps to the text's major section and learning objective. For more information, go to www.PearsonMyTest.com.



1) In order to be scientific, it must be possible to test a hypotheses.

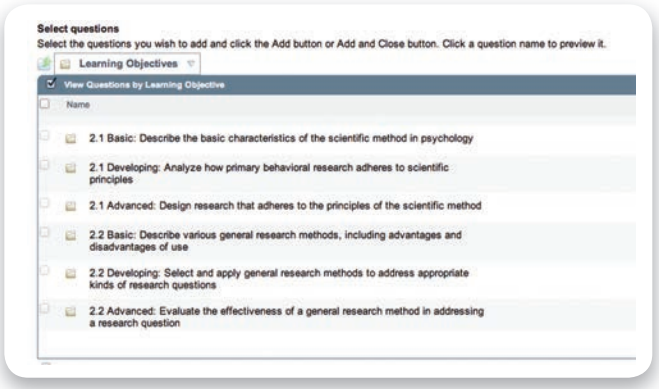
Correct: *A testable hypothesis is one that can be confirmed or rejected (you do not prove a hypothesis), and a scientific hypothesis must be testable.*

Diff: 1
Type: FIB
Page Reference: 3
Skill: Conceptual
Objective: Understand the steps of the scientific method.

2) For psychologists, critical thinking means that we apply scientific methods carefully, examine our assumptions and biases, and tolerate ambiguity when the evidence is inconclusive.

Correct: *Critical thinking involves exercising curiosity and skepticism when evaluating the claims of others, and with our own assumptions and beliefs.*

Diff: 2
Type: FIB
Page Reference: 9
Skill: Conceptual
Objective: Apply the steps in critical thinking



Select questions

Select the questions you wish to add and click the Add button or Add and Close button. Click a question name to preview it.

Learning Objectives

View Questions by Learning Objective

Name

2.1 Basic: Describe the basic characteristics of the scientific method in psychology

2.1 Developing: Analyze how primary behavioral research adheres to scientific principles

2.1 Advanced: Design research that adheres to the principles of the scientific method

2.2 Basic: Describe various general research methods, including advantages and disadvantages of use

2.2 Developing: Select and apply general research methods to address appropriate kinds of research questions

2.2 Advanced: Evaluate the effectiveness of a general research method in addressing a research question

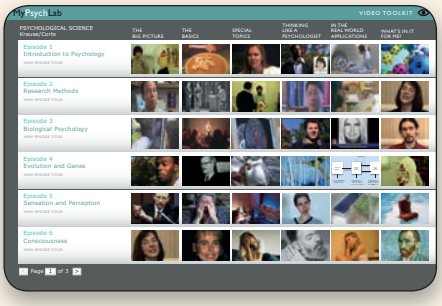
MyPsychLab

Educators know it. Students know it. It's that inspired moment when something that was difficult to understand suddenly makes perfect sense. MyPsychLab was designed and refined with a single purpose in mind—to help educators create that moment of understanding with their students.

MyPsychLab offers students useful and engaging self-assessment tools, and it provides instructors with flexibility in assessing and tracking student progress. For instructors, MyPsychLab is a powerful tool for assessing student performance and adapting course content to students' changing needs, without requiring instructors to invest additional time or resources to do so.

Instructors and students have been using MyPsychLab for more than 10 years. To date, more than 600 000 students have used MyPsychLab. During that time, three white papers on the efficacy of MyPsychLab have been published. Both the white papers and user feedback show compelling results: MyPsychLab helps students succeed and improve their test scores. One of the key ways MyPsychLab improves student outcomes is by providing continuous assessment as part of the learning process. Over the years, both instructor and student feedback have guided numerous improvements to this system, making MyPsychLab even more flexible and effective.

Pearson is committed to helping instructors and students succeed with MyPsychLab. To that end, we offer a Psychology Faculty Advisor Program designed to provide peer-to-peer support for new users of MyPsychLab. Experienced Faculty Advisors help instructors understand how MyPsychLab can improve student performance. To learn more about the Faculty Advisor Program, please contact your local Pearson representative.



MyPsychLab includes the following features:

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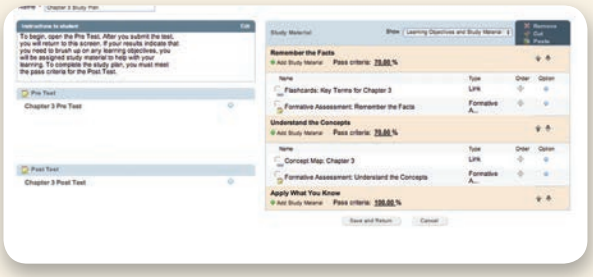


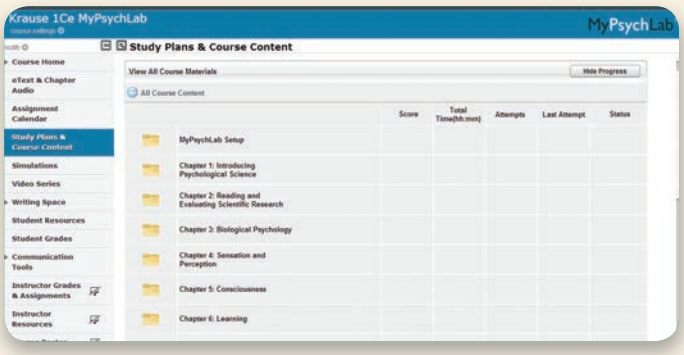
MyPsychLab Study Plan

Students have access to a personalized study plan, based on Bloom's taxonomy, that arranges content from less complex thinking (such as remembering and understanding) to more complex critical thinking (such as applying and analyzing). This layered approach promotes better critical thinking skills and helps students succeed in the course and beyond.

ASSESSMENT

MyPsychLab Simulations

Online simulations help students understand scientific principles and practise through active learning. Over thirty experiments, inventories, and surveys are available through MyPsychLab.



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We cannot fathom completing a project like this without the help and support of many individuals. Through every bit of this process have been our families and we thank you for your love, patience, and support. Although our children will be disappointed that this book is not about princesses, Spiderman, or sea creatures, we hope that they'll read and enjoy this book one day. Our extended families, particularly Peggy Salter, also provided immense support and helped our children feel loved even when we had to work late to finish this book. In addition, our departments have been wonderfully understanding and helpful, offering advice with their various specializations, providing examples and tips, reviewing drafts, and tolerating our occasional absences.

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Memorial University
of Newfoundland

Stacey Wareham-Fowler,
Memorial University of
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Ross Woolley,
Langara College

We value feedback from both instructors and students, and we are sure that we will need it for our second Canadian edition. Please do not hesitate to offer suggestions or comments by writing to Steve Smith (s.smith@uwinnipeg.ca) or Dan Dolderman (doldermanuoft@gmail.com).