

Monkey Methods

Welcome to the Jungle

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Table of contents





Research Methods in Psychology	1
Instructor	1
Course details	1
Contacting me	1
 Principles of Research in Psychology	 3
The Science of Psychology	3
Example Questions	5
Fill-In-The-Blanks (fitb())	5
Understanding Science	5
What Is Science?	5
Features of Science	6
Science Versus Pseudoscience	7
Scientific Research in Psychology	10
A Model of Scientific Research in Psychology	11
Who Conducts Scientific Research in Psychology?	13
The Broader Purposes of Scientific Research in Psychology	14
Science and Common Sense	16
Can We Rely on Common Sense?	16
How Could We Be So Wrong?	17
Science and Clinical Practice	20
Glossary	23
Acknowledgments	26
References	26

Table of contents





Appendices	29
Webexercises	29
Example Questions	29
Fill-In-The-Blanks (fitb())	29
Multiple Choice (mcq())	30
True or False (torf())	31
Longer MCQs (longmcq())	31
Checked sections	32
Hidden solutions and hints	32
Worksheet01	35
Template worksheet	37
Welcome	39
This is the first activity	39
Introduction to Q1	39
Content of Q1	39
Answer to Q1	40
This is the second activity	40
Introduction to Q2	40
Homework	41

Research Methods in Psychology

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Course details

-  Monday Lecture | Tuesday Labs
-  October to March, 2024-5
-  10am
-  PSH LG02

Contacting me

E-mail is the best ways to get in contact with me.

BODY CONTENT

Principles of Research in Psychology

The Science of Psychology

Many people believe that women tend to talk more than men—with some even suggesting that this difference has a biological basis. One widely cited estimate is that women speak 20,000 words per day on average and men speak only 7,000. Is it true? A group of psychologists led by Matias Mehl decided to find out. They checked to see if anyone had actually tried to count the daily number of words spoken by women and men. No one had. So these researchers conducted a study in which female and male college students (369 in all) wore audio recorders while they went about their lives. The result? The women spoke an average of 16,215 words per day and the men spoke an average of 15,669—an extremely small difference that could easily be explained by chance. In an article in the journal *Science*, these researchers summed up their findings as follows: “We therefore conclude, on the basis of available empirical evidence, that the widespread and highly publicized stereotype about female talkativeness is unfounded” (Mehl et al., 2007).

Principles of Research in Psychology



Figure 1: Although many people believe that women are more talkative than men, scientific research on college students suggests that there is no overall difference. *Photo by Elliott Reyna on Unsplash.*

Psychology is usually defined as the scientific study of human behavior and mental processes, and this example illustrates the features that make it scientific. In this chapter, we look closely at these features, introduce a model of scientific research in psychology, and address several basic questions that students often have about it. Who conducts scientific research in psychology? Why? Does scientific psychology tell us anything that common sense does not? Why should I bother to learn the scientific approach—especially if I want to be a clinical psychologist and not a researcher? These are extremely good questions, by the way, and answering them now will provide a solid foundation for learning the rest of the material in this book.

Example Questions

Fill-In-The-Blanks (`fitb()`)

Create fill-in-the-blank questions using `fitb()`, providing the answer as the first argument.

- 2 + 2 is _

Understanding Science

LEARNING OBJECTIVES

1. Define science.
2. Describe the three fundamental features of science.
3. Explain why psychology is a science.
4. Define pseudoscience and give some examples.

What Is Science?

Some people are surprised to learn that psychology is a science. They generally agree that astronomy, biology, and chemistry are sciences but wonder what psychology has in common with these other fields. Before answering this question, however, it is worth reflecting on what astronomy, biology, and chemistry have in common with *each other*. It is clearly not their subject matter. Astronomers study celestial bodies, biologists study living organisms, and chemists study matter and its properties. It is also not the equipment and techniques that they use. Few biologists would know what to do with a radio telescope, for example, and few chemists would know how to track a moose population in the wild. For these and other reasons, philosophers and scientists who have thought deeply about

this question have concluded that what the sciences have in common is a general approach to understanding the natural world. Psychology is a science because it takes this same general approach to understanding one aspect of the natural world: human behavior.

Features of Science

The general scientific approach has three fundamental features (Stanovich, 2013). The first is systematic empiricism. Empiricism refers to learning based on observation, and scientists learn about the natural world systematically, by carefully planning, making, recording, and analyzing observations of it. As we will see, logical reasoning and even creativity play important roles in science too, but scientists are unique in their insistence on checking their ideas about the way the world is against their systematic observations. Notice, for example, that Mehl and his colleagues did not trust other people's stereotypes or even their own informal observations. Instead, they systematically recorded, counted, and compared the number of words spoken by a large sample of women and men. Furthermore, when their systematic observations turned out to conflict with people's stereotypes, they trusted their systematic observations.

The second feature of the scientific approach—which follows in a straightforward way from the first—is that it is concerned with empirical questions. These are questions about the way the world actually is and, therefore, can be answered by systematically observing it. The question of whether women talk more than men is empirical in this way. Either women really do talk more than men or they do not, and this can be determined by systematically observing how much women and men actually talk. There are many interesting and important questions that are not empirically testable and that science cannot answer. Among them are questions about values—whether things are good or bad, just or unjust, or beautiful or ugly, and how the world *ought* to be. So although the question of whether a stereotype

is accurate or inaccurate is an empirically testable one that science can answer, the question of whether it is wrong for people to hold inaccurate stereotypes is not. Similarly, the question of whether criminal behavior has a genetic component is an empirical question, but the question of what should be done with people who commit crimes is not. It is especially important for researchers in psychology to be mindful of this distinction.

The third feature of science is that it creates public knowledge. After asking their empirical questions, making their systematic observations, and drawing their conclusions, scientists publish their work. This usually means writing an article for publication in a professional journal, in which they put their research question in the context of previous research, describe in detail the methods they used to answer their question, and clearly present their results and conclusions. Publication is an essential feature of science for two reasons. One is that science is a social process—a large-scale collaboration among many researchers distributed across both time and space. Our current scientific knowledge of most topics is based on many different studies conducted by many different researchers who have shared their work with each other over the years. The second is that publication allows science to be self-correcting. Individual scientists understand that despite their best efforts, their methods can be flawed and their conclusions incorrect. Publication allows others in the scientific community to detect and correct these errors so that, over time, scientific knowledge increasingly reflects the way the world actually is.

Science Versus Pseudoscience

Pseudoscience refers to activities and beliefs that are claimed to be scientific by their proponents—and may *appear* to be scientific at first glance—but are not. Consider the theory of biorhythms (not to be confused with sleep cycles or other biological cycles that do have a scientific basis). The idea is that people's physical, intellectual, and emotional abilities run in cycles that begin when they are born and continue until they die. The

physical cycle has a period of 23 days, the intellectual cycle a period of 33 days, and the emotional cycle a period of 28 days. So, for example, if you had the option of when to schedule an exam, you would want to schedule it for a time when your intellectual cycle will be at a high point. The theory of biorhythms has been around for more than 100 years, and you can find numerous popular books and websites about biorhythms, often containing impressive and scientific-sounding terms like *sinusoidal wave* and *bioelectricity*. The problem with biorhythms, however, is that there is no good reason to think they exist (Hines, 1998).

A set of beliefs or activities can be said to be pseudoscientific if (a) its adherents claim or imply that it is scientific but (b) it lacks one or more of the three features of science. It might lack systematic empiricism. Either there is no relevant scientific research or, as in the case of biorhythms, there is relevant scientific research but it is ignored. It might also lack public knowledge. People who promote the beliefs or activities might claim to have conducted scientific research but never publish that research in a way that allows others to evaluate it.

A set of beliefs and activities might also be pseudoscientific because it does not address empirical questions. The philosopher Karl Popper was especially concerned with this idea (Popper, 2014). He argued more specifically that any scientific claim must be expressed in such a way that there are observations that would—if they were made—count as evidence against the claim. In other words, scientific claims must be falsifiable. The claim that women talk more than men is falsifiable because systematic observations could reveal either that they do talk more than men or that they do not. As an example of an unfalsifiable claim, consider that many people who study extrasensory perception (ESP) and other psychic powers claim that such powers can disappear when they are observed too closely. This makes it so that no possible observation would count as evidence against ESP. If a careful test of a self-proclaimed psychic showed that she predicted the future at better-than-chance levels, this would be consistent with the claim that she had psychic powers. But if she failed to predict the future at better-than-chance levels, this would also be consis-

tent with the claim because her powers can supposedly disappear when they are observed too closely.

Why should we concern ourselves with pseudoscience? There are at least three reasons. One is that learning about pseudoscience helps bring the fundamental features of science—and their importance—into sharper focus. A second is that biorhythms, psychic powers, astrology, and many other pseudoscientific beliefs are widely held and are promoted on the Internet, on television, and in books and magazines. Learning what makes them pseudoscientific can help us to identify and evaluate such beliefs and practices when we encounter them. A third reason is that many pseudosciences purport to explain some aspect of human behavior and mental processes, including biorhythms, astrology, graphology (handwriting analysis), and magnet therapy for pain control. It is important for students of psychology to distinguish their own field clearly from this “pseudopsychology.”

The Skeptic's Dictionary

An excellent source for information on pseudoscience is The Skeptic's Dictionary (<http://www.skeptdic.com>). Among the pseudoscientific beliefs and practices you can learn about are the following:

- **Cryptozoology.** The study of “hidden” creatures like Bigfoot, the Loch Ness monster, and the chupacabra.
- **Pseudoscientific psychotherapies.** Past-life regression, rebirthing therapy, and bioscream therapy, among others.
- **Homeopathy.** The treatment of medical conditions using natural substances that have been diluted sometimes to the point of no longer being present.
- **Pyramidology.** Odd theories about the origin and function of the Egyptian pyramids (e.g., that they were built by extraterrestrials) and the idea that pyramids in general have healing and other special powers.

KEY TAKEAWAYS

- Science is a general way of understanding the natural world. Its three fundamental features are systematic empiricism, empirical questions, and public knowledge.
- Psychology is a science because it takes the scientific approach to understanding human behavior.
- Pseudoscience refers to beliefs and activities that are claimed to be scientific but lack one or more of the three features of science. It is important to distinguish the scientific approach to understanding human behavior from the many pseudoscientific approaches.

EXERCISES

1. Discussion: People sometimes suggest that psychology cannot be a science because either (a) human behavior cannot be predicted with perfect accuracy or (b) much of its subject matter (e.g., thoughts and feelings) cannot be observed directly. Do you agree or disagree with each of these ideas? Why?
2. Practice: List three empirical questions about human behavior. List three nonempirical questions about human behavior.
3. Discussion: Consider the following psychological claim. “People’s choice of spouse is strongly influenced by their perception of their own parents. Some choose a spouse who is similar in some way to one of their parents. Others choose a spouse who is different from one of their parents.” Is this claim falsifiable? Why or why not?

Scientific Research in Psychology

LEARNING OBJECTIVES

Scientific Research in Psychology

1. Describe a general model of scientific research in psychology and give specific examples that fit the model.
2. Explain who conducts scientific research in psychology and why they do it.
3. Distinguish between basic research and applied research.

A Model of Scientific Research in Psychology

Figure @ref(fig:scientificmethod) presents a more specific model of scientific research in psychology. The researcher (who more often than not is really a small group of researchers) formulates a research question, conducts a study designed to answer the question, analyzes the resulting data, draws conclusions about the answer to the question, and publishes the results so that they become part of the research literature. Because the research literature is one of the primary sources of new research questions, this process can be thought of as a cycle. New research leads to new questions, which lead to new research, and so on. Figure @ref(fig:scientificmethod) also indicates that research questions can originate outside of this cycle either with informal observations or with practical problems that need to be solved. But even in these cases, the researcher would start by checking the research literature to see if the question had already been answered and to refine it based on what previous research had already found.

Principles of Research in Psychology

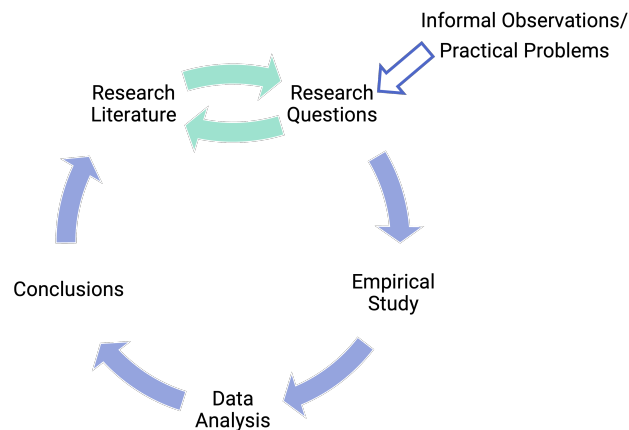


Figure 2: A simple model of scientific research in psychology.

The research by Mehl and his colleagues is described nicely by this model. Their question—whether women are more talkative than men—was suggested to them both by people’s stereotypes and by published claims about the relative talkativeness of women and men. When they checked the research literature, however, they found that this question had not been adequately addressed in scientific studies. They conducted a careful empirical study, analyzed the results (finding very little difference between women and men), and published their work so that it became part of the research literature. The publication of their article is not the end of the story, however, because their work suggests many new questions (about the reliability of the result, about potential cultural differences, etc.) that will likely be taken up by them and by other researchers inspired by their work.

As another example, consider that as cell phones became more widespread during the 1990s, people began to wonder whether, and to what extent, cell phone use had a negative effect on driving. Many psychologists decided to tackle this question scientifically (Collet et al.,

2010). It was clear from previously published research that engaging in a simple verbal task impairs performance on a perceptual or motor task carried out at the same time, but no one had studied the effect specifically of cell phone use on driving. Under carefully controlled conditions, these researchers compared people's driving performance while using a cell phone with their performance while not using a cell phone, both in the lab and on the road. They found that people's ability to detect road hazards, reaction time, and control of the vehicle were all impaired by cell phone use. Each new study was published and became part of the growing research literature on this topic.



Figure 3: Scientific research has confirmed that cell phone use impairs a variety of driving behaviors. *Photo by Alexandre Boucher on Unsplash.*

Who Conducts Scientific Research in Psychology?

Scientific research in psychology is generally conducted by people with doctoral degrees (usually the doctor of philosophy, or PhD) and master's degrees in psychology and related fields, often supported by research assistants with bachelor's degrees or other relevant training. Some of them work for government agencies (e.g., the National Institute of Mental Health), for nonprofit organizations (e.g., the American Cancer Society),

Principles of Research in Psychology

or in the private sector (e.g., in product development). However, the majority of them are college and university faculty, who often collaborate with their graduate and undergraduate students. Although some researchers are trained and licensed as clinicians—especially those who conduct research in clinical psychology—the majority are not. Instead, they have expertise in one or more of the many other subfields of psychology: behavioral neuroscience, cognitive psychology, developmental psychology, personality psychology, social psychology, and so on. Doctoral-level researchers might be employed to conduct research full-time or, like many college and university faculty members, to conduct research in addition to teaching classes and serving their institution and community in other ways.

Of course, people also conduct research in psychology because they enjoy the intellectual and technical challenges involved and the satisfaction of contributing to scientific knowledge of human behavior. You might find that you enjoy the process too. If so, your college or university might offer opportunities to get involved in ongoing research as either a research assistant or a participant. Of course, you might find that you do not enjoy the process of conducting scientific research in psychology. But at least you will have a better understanding of where scientific knowledge in psychology comes from, an appreciation of its strengths and limitations, and an awareness of how it can be applied to solve practical problems in psychology and everyday life.

The Broader Purposes of Scientific Research in Psychology

People have always been curious about the natural world, including themselves and their behavior. (In fact, this is probably why you are studying psychology in the first place.) Science grew out of this natural curiosity and has become the best way to achieve detailed and accurate knowledge. Keep in mind that most of the phenomena and theories that fill

psychology textbooks are the products of scientific research. In a typical introductory psychology textbook, for example, one can learn about specific cortical areas for language and perception, principles of classical and operant conditioning, biases in reasoning and judgment, and people's surprising tendency to obey authority. And scientific research continues because what we know right now only scratches the surface of what we can know.

Scientific research is often classified as being either basic or applied. Basic research in psychology is conducted primarily for the sake of achieving a more detailed and accurate understanding of human behavior, without necessarily trying to address any particular practical problem. The research of Mehl and his colleagues falls into this category. Applied research is conducted primarily to address some practical problem. Research on the effects of cell phone use on driving, for example, was prompted by safety concerns and has led to the enactment of laws to limit this practice. Although the distinction between basic and applied research is convenient, it is not always clear-cut. For example, basic research on sex differences in talkativeness could eventually have an effect on how marriage therapy is practiced, and applied research on the effect of cell phone use on driving could produce new insights into basic processes of perception, attention, and action.

KEY TAKEAWAYS

- Research in psychology can be described by a simple cyclical model. A research question based on the research literature leads to an empirical study, the results of which are published and become part of the research literature.
- Scientific research in psychology is conducted mainly by people with doctoral degrees in psychology and related fields, most of whom are college and university faculty members. They do so for professional and for personal reasons, as well as to contribute to scientific knowledge about human behavior.

Principles of Research in Psychology

- Basic research is conducted to learn about human behavior for its own sake, and applied research is conducted to solve some practical problem. Both are valuable, and the distinction between the two is not always clear-cut.

EXERCISES

1. Practice: Find a description of an empirical study in a professional journal or in one of the scientific psychology blogs. Then write a brief description of the research in terms of the cyclical model presented here. One or two sentences for each part of the cycle should suffice.
2. Practice: Based on your own experience or on things you have already learned about psychology, list three basic research questions and three applied research questions of interest to you.

Science and Common Sense

LEARNING OBJECTIVES

1. Explain the limitations of common sense when it comes to achieving a detailed and accurate understanding of human behavior.
2. Give several examples of common sense or folk psychology that are incorrect.
3. Define skepticism and its role in scientific psychology.

Can We Rely on Common Sense?

Some people wonder whether the scientific approach to psychology is necessary. Can we not reach the same conclusions based on common sense or intuition? Certainly we all have intuitive beliefs about people's behavior, thoughts, and feelings—and these beliefs are collectively referred to as

folk psychology. Although much of our folk psychology is probably reasonably accurate, it is clear that much of it is not. For example, most people believe that anger can be relieved by “letting it out”—perhaps by punching something or screaming loudly. Scientific research, however, has shown that this approach tends to leave people feeling more angry, not less (Bushman, 2002). Likewise, most people believe that no one would confess to a crime that he or she had not committed, unless perhaps that person was being physically tortured. But again, extensive empirical research has shown that false confessions are surprisingly common and occur for a variety of reasons (Kassin & Gudjonsson, 2004).

Some Great Myths

In *50 Great Myths of Popular Psychology*, psychologist Scott Lilienfeld and colleagues discuss several widely held commonsense beliefs about human behavior that scientific research has shown to be incorrect (Lilienfeld et al., 2010). Here is a short list.

- “People use only 10% of their brain power.”
- “Most people experience a midlife crisis in their 40’s or 50’s.”
- “Students learn best when teaching styles are matched to their learning styles.”
- “Low self-esteem is a major cause of psychological problems.”
- “Psychiatric admissions and crimes increase during full moons.”

How Could We Be So Wrong?

How can so many of our intuitive beliefs about human behavior be so wrong? Notice that this is a psychological question, and it just so happens that psychologists have conducted scientific research on it and identified many contributing factors (Gilovich, 2008). One is that forming detailed and accurate beliefs requires powers of observation, memory, and analysis to an extent that we do not naturally possess. It would be nearly impossible

to count the number of words spoken by the women and men we happen to encounter, estimate the number of words they spoke per day, average these numbers for both groups, and compare them—all in our heads. This is why we tend to rely on mental shortcuts in forming and maintaining our beliefs. For example, if a belief is widely shared—especially if it is endorsed by “experts”—and it makes intuitive sense, we tend to assume it is true. This is compounded by the fact that we then tend to focus on cases that confirm our intuitive beliefs and not on cases that disconfirm them. This is called confirmation bias. For example, once we begin to believe that women are more talkative than men, we tend to notice and remember talkative women and silent men but ignore or forget silent women and talkative men. We also hold incorrect beliefs in part because it would be nice if they were true. For example, many people believe that calorie-reducing diets are an effective long-term treatment for obesity, yet a thorough review of the scientific evidence has shown that they are not (Mann et al., 2007). People may continue to believe in the effectiveness of dieting in part because it gives them hope for losing weight if they are obese or makes them feel good about their own “self-control” if they are not.

Scientists—especially psychologists—understand that they are just as susceptible as anyone else to intuitive but incorrect beliefs. This is why they cultivate an attitude of skepticism. Being skeptical does not mean being cynical or distrustful, nor does it mean questioning every belief or claim one comes across (which would be impossible anyway). Instead, it means pausing to consider alternatives and to search for evidence—especially systematically collected empirical evidence—when there is enough at stake to justify doing so. Imagine that you read a magazine article that claims that giving children a weekly allowance is a good way to help them develop financial responsibility. This is an interesting and potentially important claim (especially if you have kids). Taking an attitude of skepticism, however, would mean pausing to ask whether it might be instead that receiving an allowance merely teaches children to spend money—perhaps even to be more materialistic. Taking an attitude of skepticism would also mean asking what evidence supports

the original claim. Is the author a scientific researcher? Is any scientific evidence cited? If the issue was important enough, it might also mean turning to the research literature to see if anyone else had studied it.

Because there is often not enough evidence to fully evaluate a belief or claim, scientists also cultivate tolerance for uncertainty. They accept that there are many things that they simply do not know. For example, it turns out that there is no scientific evidence that receiving an allowance causes children to be more financially responsible, nor is there any scientific evidence that it causes them to be materialistic. Although this kind of uncertainty can be problematic from a practical perspective—for example, making it difficult to decide what to do when our children ask for an allowance—it is exciting from a scientific perspective. If we do not know the answer to an interesting and empirically testable question, science may be able to provide the answer.

KEY TAKEAWAYS

- People's intuitions about human behavior, also known as folk psychology, often turn out to be wrong. This is one primary reason that psychology relies on science rather than common sense.
- Researchers in psychology cultivate certain critical-thinking attitudes. One is skepticism. They search for evidence and consider alternatives before accepting a claim about human behavior as true. Another is tolerance for uncertainty. They withhold judgment about whether a claim is true or not when there is insufficient evidence to decide.

EXERCISES

1. Practice: For each of the following intuitive beliefs about human behavior, list three reasons that it might be true and three reasons that it might not be true:

- You cannot truly love another person unless you love yourself.
- People who receive “crisis counseling” immediately after experiencing a traumatic event are better able to cope with that trauma in the long term.
- Studying is most effective when it is always done in the same location.

Science and Clinical Practice

LEARNING OBJECTIVES

1. Define the clinical practice of psychology and distinguish it from the science of psychology.
2. Explain how science is relevant to clinical practice.
3. Define the concept of an empirically supported treatment and give some examples.

Again, psychology is the scientific study of behavior and mental processes. But it is also the application of scientific research to “help people, organizations, and communities function better” (American Psychological Association, 2011). By far the most common and widely known application is the clinical practice of psychology—the diagnosis and treatment of psychological disorders and related problems. Let us use the term *clinical practice* broadly to refer to the activities of clinical and counseling psychologists, school psychologists, marriage and family therapists, licensed clinical social workers, and others who work with people individually or in small groups to identify and solve their psychological problems. It is important to consider the relationship between scientific research and clinical practice because many students are especially interested in clinical practice, perhaps even as a career.

The main point is that psychological disorders and other behavioral problems are part of the natural world. This means that questions about their

nature, causes, and consequences are empirically testable and therefore subject to scientific study. As with other questions about human behavior, we cannot rely on our intuition or common sense for detailed and accurate answers. Consider, for example, that dozens of popular books and thousands of websites claim that adult children of alcoholics have a distinct personality profile, including low self-esteem, feelings of powerlessness, and difficulties with intimacy. Although this sounds plausible, scientific research has demonstrated that adult children of alcoholics are no more likely to have these problems than anybody else (Lilienfeld et al., 2010). Similarly, questions about whether a particular psychotherapy works are empirically testable questions that can be answered by scientific research. If a new psychotherapy is an effective treatment for depression, then systematic observation should reveal that depressed people who receive this psychotherapy improve more than a similar group of depressed people who do not receive this psychotherapy (or who receive some alternative treatment). Treatments that have been shown to work in this way are called empirically supported treatments.



Figure 4: The effectiveness of various forms of psychotherapy—for example, cognitive behavioral therapy for depression—can be determined by scientific research. *Photo by Priscilla Du Preez on Unsplash.*

Empirically Supported Treatments

An empirically supported treatment is one that has been studied scientifically and shown to result in greater improvement than no treatment, a placebo, or some alternative treatment. These include many forms of psychotherapy, which can be as effective as standard drug therapies. Among the forms of psychotherapy with strong empirical support are the following:

- **Cognitive behavioral therapy.** For depression, panic disorder, bulimia nervosa, and posttraumatic stress disorder.
- **Exposure therapy.** For posttraumatic stress disorder.
- **Behavioral therapy.** For depression.
- **Behavioral couples therapy.** For alcoholism and substance abuse.
- **Exposure therapy with response prevention.** For obsessive-compulsive disorder.
- **Family therapy.** For schizophrenia.

For a more complete list, see the following website, which is maintained by Division 12 of the American Psychological Association, the Society for Clinical Psychology: <https://div12.org/treatments/>.

Many in the clinical psychology community have argued that their field has not paid enough attention to scientific research—for example, by failing to use empirically supported treatments—and have suggested a variety of changes in the way clinicians are trained and treatments are evaluated and put into practice. Others believe that these claims are exaggerated and the suggested changes are unnecessary (Norcross et al., 2006). On both sides of the debate, however, there is agreement that a scientific approach to clinical psychology is essential if the goal is to diagnose and treat psychological problems based on detailed and accurate knowledge about those problems and the most effective treatments for them. So not only is it important for scientific research in clinical psychology to continue, but it is also important for clinicians who never conduct a scientific study themselves to be scientifically literate so that they can read and evaluate new research and make treatment decisions based on the best available evidence.

KEY TAKEAWAYS

- The clinical practice of psychology—the diagnosis and treatment of psychological problems—is one important application of the scientific discipline of psychology.
- Scientific research is relevant to clinical practice because it provides detailed and accurate knowledge about psychological problems and establishes whether treatments are effective.

EXERCISES

1. Discussion: Some clinicians argue that what they do is an “art form” based on intuition and personal experience and therefore cannot be evaluated scientifically. Write a paragraph about how satisfied you would be with such a clinician and why from each of three perspectives:
 - a potential client of the clinician
 - a judge who must decide whether to allow the clinician to testify as an expert witness in a child abuse case
 - an insurance company representative who must decide whether to reimburse the clinician for his or her services
2. Practice: Create a short list of questions that a client could ask a clinician to determine whether he or she pays sufficient attention to scientific research.

Glossary

applied research

Scientific research that is conducted primarily to solve some practical problem.

Principles of Research in Psychology

basic research

Scientific research that is conducted primarily for the sake of learning something new.

clinical practice of psychology

The diagnosis and treatment of psychological disorders and related problems.

confirmation bias

The tendency to notice and remember evidence that is consistent with what we already believe, as opposed to evidence that is inconsistent with what we already believe.

doctor of philosophy

The highest degree in most academic fields, including psychology. Scientific researchers in psychology typically have this degree. Often shortened to PhD.

empirical question

A question about the way the world actually is that can be answered by making systematic observations.

empirically supported treatment

A treatment for a psychological problem that has been shown by scientific research to result in greater improvement than no treatment, a placebo, or some alternative treatment.

falsifiable

An important property of scientific claims. A claim is falsifiable if there is an observation that would—if it were made—count as evidence against the claim.

folk psychology

People's intuitive beliefs about human behavior and mental processes.

pseudoscience

A set of beliefs or activities that is claimed to be scientific but lacks one or more of the three features of science.

public knowledge

Detailed descriptions of research that are available to other researchers and the general public, usually through publication in a professional journal.

science

A general way of understanding the natural world featuring systematic empiricism, empirical questions, and public knowledge.

skepticism

A critical-thinking attitude that involves considering alternatives and searching for evidence before accepting that a belief or claim is true.

systematic empiricism

Learning about the world through careful observation.

tolerance for uncertainty

A critical-thinking attitude that involves withholding judgment about whether a belief or claim is true when there is insufficient evidence for it.

Acknowledgments

This page includes content from a number of legendary authors and gangsters. Mention them all here alongside update information.

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Webexercises

This is a Web Exercise template created by the psychology teaching team at the University of Glasgow, based on ideas from Software Carpentry. This template shows how instructors can easily create interactive web documents that students can use in self-guided learning.

The `{webexercises}` package provides a number of functions that you use in inline R code or through code chunk options to create HTML widgets (text boxes, pull down menus, buttons that reveal hidden content). Examples are given below. Render this file to HTML to see how it works.

NOTE: To use the widgets in the compiled HTML file, you need to have a JavaScript-enabled browser.

Example Questions

Fill-In-The-Blanks (`fitb()`)

Create fill-in-the-blank questions using `fitb()`, providing the answer as the first argument.

- 2 + 2 is _

You can also create these questions dynamically, using variables from your R session.

- The square root of 4 is: _

Webexercises

The blanks are case-sensitive; if you don't care about case, use the argument `ignore_case = TRUE`.

- What is the letter after D? _

If you want to ignore differences in whitespace use, use the argument `ignore_ws = TRUE` (which is the default) and include spaces in your answer anywhere they could be acceptable.

- How do you load the tidyverse package? _____

You can set more than one possible correct answer by setting the answers as a vector.

- Type a vowel: _

You can use regular expressions to test answers against more complex rules.

- Type any 3 letters: ___

Multiple Choice (`mcq()`)

- "Never gonna give you up, never gonna:
- (A) let you go
- (B) turn you down
- (C) run away
- (D) let you down

" - "I

Example Questions

- (A) bless the rains
- (B) guess it rains
- (C) sense the rain

down in Africa” -Toto

True or False (`torf()`)

- True or False? You can permute values in a vector using `sample()`.
TRUE / FALSE

Longer MCQs (`longmcq()`)

When your answers are very long, sometimes a drop-down select box gets formatted oddly. You can use `longmcq()` to deal with this. Since the answers are long, It's probably best to set up the options inside an R chunk with `echo=FALSE`.

What is a p-value?

- (A) the probability that the null hypothesis is true
- (B) the probability of the observed, or more extreme, data, under the assumption that the null-hypothesis is true
- (C) the probability of making an error in your conclusion

What is true about a 95% confidence interval of the mean?

- (A) if you repeated the process many times, 95% of intervals calculated in this way contain the true mean

Webexercises

- (B) there is a 95% probability that the true mean lies within this range
- (C) 95% of the data fall within this range

Checked sections

Create sections with the class `webex-check` to add a button that hides feedback until it is pressed. Add the class `webex-box` to draw a box around the section (or use your own styles).

I am going to learn a lot: TRUE / FALSE

What is a p-value?

- (A) the probability that the null hypothesis is true
- (B) the probability of the observed, or more extreme, data, under the assumption that the null-hypothesis is true
- (C) the probability of making an error in your conclusion

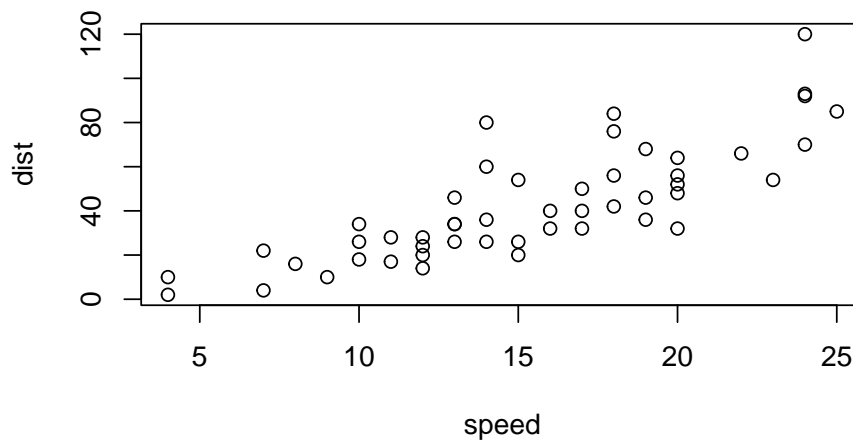
Hidden solutions and hints

You can fence off a solution area that will be hidden behind a button using `hide()` before the solution and `unhide()` after, each as inline R code. Pass the text you want to appear on the button to the `hide()` function.

If the solution is a code chunk, instead of using `hide()` and `unhide()`, simply set the `webex.hide` chunk option to `TRUE`, or set it to the string you wish to display on the button.

Recreate the scatterplot below, using the built-in `cars` dataset.

Hidden solutions and hints



I need a hint

See the documentation for `plot()` (`?plot`)

[Click here to see the solution](#)

```
plot(cars$speed, cars$dist)
```


Worksheet01

Template worksheet

Welcome

Welcome to a demo HTML Document that uses the `quarto-webr` extension to generate interactive code cells with Quarto and webR.

```
print("Hello there! Welcome to your Year 1 Research Methods Textbook!")
```

```
fit = lm(mpg ~ am, data = mtcars)
summary(fit)
```

aag

This is the first activity

htree

Introduction to Q1

float

Content of Q1

burden

Welcome

Answer to Q1

trapper

This is the second activity

smelly

Introduction to Q2

fandango

Homework

surge

