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Chapter 2

How Psychologists Do Research

▲ TABLE OF CONTENTS

To access the resource listed, click on the hot linked title or press **CTRL + click**
To return to the Table of Contents, click on **▲ Return to Table of Contents**
To return to a section of the Lecture Guide, click on **► Return to Lecture Guide**

► CHAPTER 2 ANSWER KEY
► LECTURE GUIDE

- What Makes Psychological Research Scientific? (p. 43)
- Answers to Quiz for Module 2.1 (p. 44)
- Descriptive Studies: Establishing the Facts (p.44)
- Answers to Quiz for Module 2.2 (p. 46)
- Correlational Studies: Looking for Relationships (p. 46)
- Answers to Quiz for Module 2.3 (p. 47)
- Experiments: Hunting for Causes (p. 47)
- Answers to Quiz for Module 2.4 (p. 48)
- Evaluating the Findings (p. 48)
- Answers to Quiz for Module 2.5 (p. 48)
- Keeping the Enterprise Ethical (p. 49)

▼ FULL CHAPTER RESOURCES

- Lecture Guide (p. 43)
- Learning Objectives (p. 49)
- Rapid Review (p. 50)
- Lecture Launchers and Discussion Topics (p. 51)
- Activities and Exercises (p. 62)
- Handout Masters (p. 71)
- MyPsychLab Multimedia Resources (p. 77)
- REVEL Multimedia Resources (p. 78)
- Answers to Chapter 2 Quiz (p. 79)

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► Chapter 2 Answer Key

End-of-Module Quiz 2.1

1 D
2 B
3 A
4 C
5 A

End-of-Module Quiz 2.2

1 B
2 A
3 B
4 D
5 C

End-of-Module Quiz 2.3

1 A
2 A
3 D
4 D
5 A

End-of-Module Quiz 2.4

1 B
2 A
3 D
4 B
5 A

End-of-Module Quiz 2.5

1 A
2 C
3 B
4 B
5 D

End-of-Module Quiz 2.6

1 D
2 A
3 C
4 B
5 A

End-of-Chapter Quiz

1 D
2 D
3 B

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4 A
5 B
6 D
7 C
8 A
9 C
10 C
11 B
12 D
13 A
14 A
15 B
16 B
17 A
18 B
19 D

▲ Return to Chapter 2: Table of Contents

► Lecture Guide

I. WHAT MAKES PSYCHOLOGICAL RESEARCH SCIENTIFIC? (text p. 34)

Learning Objective 2.1.A – Distinguish between a theory, a hypothesis, and an operational definition.

A. Characteristics of the Ideal Psychologist as Scientist

- *Activity 2.1: Are Psychologists Scientists?*

1. Precision and Reliance on Empirical Evidence
   a. Begin with a theory (an organized set of assumptions and principles used to explain a particular phenomenon and how they are related)
   b. Develop a hypothesis (a statement that attempts to describe or explain a given behavior)
   c. Create operational definitions of a phenomenon so that one can objectively measure that phenomenon

- *Lecture Launcher 2.1: How Do We Know What We Know?*
- *Activity 2.2: Inference or Observation?*
- *Activity 2.3: Operational Definitions of Handedness*
- *Handout 2.1: Inference or Observation?*
- *Handout 2.2: Operational Definitions of Handedness*

Learning Objective 2.1.B – Explain why skepticism in science involves more than just disbelief.

2. Skepticism
   a. Scientists do not accept ideas on faith or authority.
   b. Not simply about debunking some claim, but showing *why* the claim is invalid – so that better methods can replace it

- *Lecture Launcher 2.2: The Madden Curse*
- *Activity 2.4: Which Methods Would You Use?*

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Learning Objective 2.1.C – Explain why falsifiability is an important component of scientific research.

3. Willingness to make "risky predictions"
    a. Principle of falsifiability
        i. Does not mean that the idea *will* be disproved, only that it could be if contrary evidence were to be discovered
        ii. A scientist must risk disconfirmation by predicting not only what will happen, but also what *will not* happen.
    b. Confirmation bias
        i. The tendency to look for and accept evidence that supports our pet theories and assumptions and to ignore or reject evidence that contradicts our beliefs
        ii. The principle of falsifiability compels scientists – and the rest of us – to resist the confirmation bias and to consider counterevidence.

- *Activity 2.5: Can Science Answer This Question?*
- *Handout 2.3: Can Science Answer This Question?*

Learning Objective 2.1.D – Describe why openness and replication are important qualities of the scientific enterprise.

4. Openness
    a. Science depends on the free flow of ideas and full disclosure of the procedures in a study.
    b. Scientists must be willing to tell others where they got their ideas, how they tested them, and what the results were.
    c. Replication is an essential part of the scientific process because sometimes what seems to be a fabulous phenomenon turns out to be only a fluke.
    d. Scientists are expected to submit their results to professional journals, which send the findings to experts in the field for evaluation before deciding whether to publish them.
        i. This process, called *peer review*, is an effort to ensure that the work lives up to accepted scientific standards.

- *Lecture Launcher 2.3: From the Lab to the World*

▲ Return to Chapter 2: Table of Contents

Answers to Quiz for Module 2.1

1 B
2 A
3 D
4 B
5 A

II. DESCRIPTIVE STUDIES: ESTABLISHING THE FACTS (text p. 40)

Learning Objective 2.2.A – Describe the major ways participants are selected for psychological studies, and why the method of selection might influence interpretations of a study's outcomes.

A. One of the first challenges facing any researcher, no matter what method is used, is to select the participants (sometimes called "subjects") for the study.

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1. Ideally, the researcher would like to get a representative sample, a group of participants that accurately represents the larger population that the researcher is interested in.
2. Many studies are based on unrepresentative samples.

- *Lecture Launcher 2.4: Online Polls*
- *Activity 2.6: Name That Research Method*
- *Handout 2.4: Name That Research Method*

Learning Objective 2.2.B – Discuss the advantages and disadvantages of using case studies as a means of data collection.

B. Case study
   1. Also called *case history*
   2. Detailed description of a particular individual based on careful observation or formal psychological testing
   3. Drawbacks of case studies:
      i. Information is often missing or hard to interpret.
      ii. The observer who writes up the case may have certain biases that influence which facts are noticed or overlooked.
      iii. The person who is the focus of the study may have selective or inaccurate memories, making any conclusions unreliable.
      iv. The person may be unrepresentative of the group the researcher is interested in.

Learning Objective 2.2.C – Discuss the advantages and disadvantages of using observational methods as a means of data collection.

C. In observational studies a researcher observes, measures, and records behavior, taking care to avoid intruding on people (or animals) being observed.
   1. The primary purpose of naturalistic is to find out how people or animals act in their normal social environments.
   2. A laboratory observation allows the researcher to control the environment
   3. Shortocmings of laboratory observation:
      i. The presence of researchers and special equipment may cause people to behave differently than they would in their ususal surroundings.
      ii. These types of studies are more useful for describing behavior than explaining it.

- *Lecture Launcher 2.5: Wundt's Other Method: Historical and Cultural Psychology*
- *Activity 2.7: Making Statistics Relevant*
- *Activity 2.8: Observational Research in the Dining Hall*
- *Handout 2.5: Making Statistics Relevant*

Learning Objective 2.2.D – Explain why norms, reliability, and validity are the three key hallmarks of any standardized psychological test.

D. Psychological tests, sometimes called *assessment instruments*, are procedures for measuring and evaluating personality traits, emotions, aptitudes, interests, abilities and values.
   1. Objective tests, also called *inventories*, measure beliefs, feelings, or behaviors of which an individual is aware.
   2. Projective tests are desinged to tap unconscious feelings or motives.
   3. Qualities of a good test

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a. Standardized
b. Normed
c. Reliable
d. Valid

Learning Objective 2.2.E – Describe the advantages and limitations of using surveys in data collection.

E. Surveys are questionnaires and interviews that gather information by asking people *directly* about their experiences, attitudes, or opinions.
   1. A representative sample is essential--watch out for volunteer bias.
      a. People who are willing to volunteer their opinions may differ from those who decline to take part.
   2. People sometimes lie, especially when the survey is about a sensitive or embarrasing topic and anonymity is not guarenteed.
   3. Think about how the questions are phrased.

▲ Return to Chapter 2: Table of Contents

Answers to Quiz for Module 2.2

1 D
2 A
3 C
4 C
5 D

III. CORRELATIONAL STUDIES: LOOKING FOR RELATIONSHIPS (text p. 45)

Learning Objective 2.3.A – Illustrate with an example how the correlation coefficient gives both the size and direction of the relationship between two variables.

Learning Objective 2.3.B – Explain why a correlation between two variables does not establish a causal relationship between those variables.

A. A positive correlation means that high values of one variable are associated with high values of the other and that low values of one variable are associated with low values of the other.
B. A negative correlation means that high values of one variable are associated with *low* values of the other.
C. The statistic used to express a correlation is called the correlation coefficient. A perfect positive correlation has a coefficient of +1.00, and a perfect negative correlation has a coefficient of –100.
D. When there is no association between two variables, the coefficient is zero or close to zero.
E. A correlation does not establish causation.

- *Lecture Launcher 2.6: Correlation and Causality*
- *Activity 2.9: Understanding Correlations*
- *Activity 2.10: Correlating Shoe Size and Height*
- *Activity 2.11: Wonder Horse Dials 911 To Save Boy's Life*
- *Handout 2.6: Understanding Correlations*

▲ Return to Chapter 2: Table of Contents

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Answers to Quiz for Module 2.3

1 D
2 B
3 A
4 B
5 A

IV. EXPERIMENTS: HUNTING FOR CAUSES (text p. 51)

Learning Objective 2.4.A – Contrast an independent variable from a dependent variable, and give an example of each concept in a psychology experiment.

A. Experimental variables
   1. The aspect of an experimental situation manipulated or varied by the researcher is known as the independent variable.
   2. The dependent variable is the reaction of the participants – the behavior that the researcher tries to predict.
   3. Ideally, everything in the experimental situation except the independent variable is kept the same for all participants.

➢ *Activity 2.12: Softens Hands While You Do Dishes*

Learning Objective 2.4.B – Explain the difference between an experimental group and a control group, and discuss how random assignment helps create these two groups.

B. Experimental and control conditions
   1. Participants should be randomly assigned to either the experimental or the control condition.
   2. In the control condition, participants are not exposed to the treatment, whereas they are when in the experimental condition.
   3. In the control condition, participants may receive a placebo--a fake treatment (e.g., no active ingredients).

➢ *Activity 2.13: Testing Random Assignment*

Learning Objective 2.4.C –Explain why single-blind and double-blind procedures are crucial to establishing the soundness of an experiment.

C. Experimenter effects
   1. Participants' responses may be influenced by the experimenter's subtle cues.
   2. One solution is to use double-blind studies.

D. Advantages and limitations of experiments
   1. Like any method, experimentation offers a range of advantages and limitations.
      a. Field versus lab, natural versus artificial situations etc.

➢ *Activity 2.14: Promoting Cultural Awareness*

▲ Return to Chapter 2: Table of Contents

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Answers to Quiz for Module 2.4

1 C
2 C
3 B
4 A
5 C

V. EVALUATING THE FINDINGS (text p. 55)

Learning Objective 2.5.A – Provide an example of how the arithmetic mean and standard deviation could be used to compare the performance of two groups of research participants.

A. Descriptive statistics: Finding out what's so
   1. Descriptive statistics organize and summarize research data.
      a. The arithmetic mean is the sum of scores divided by the number of scores.
      b. The standard deviation tells how clustered or spread out the individual scores are around the mean.

Learning Objective 2.5.B – Explain what a statistically significant research result means to an experimenter.

B. Inferential statistics: Asking "so what?"
   1. Inferential statistics allow the researcher to draw inferences about how statistically meaningful a study's results are.
      a. If the likelihood of getting the result by chance is very low, the result is statistically significant.

- *Lecture Launcher 2.7: Damned Lies, Damned Statisticians*

Learning Objective 2.5.C – Compare cross-sectional and longitudinal studies, and discuss how effect size, meta-analysis, and Bayesian statistics allow us to judge the importance of a research outcome.

C. Interpreting the findings
   1. Choosing the best explanation–the hypothesis may need to be tested in different ways (e.g., cross-sectionally and longitudinally).
   2. Judging the result's importance
      a. Researchers may disagree on its relevance for theory or practice.
      b. Meta-analysis is a technique that combines data from many studies.

- *Lecture Launcher 2.8: Basic Research vs. Applied Research*
- *Lecture Launcher 2.9: Size Matters*
- *Lecture Launcher 2.10: The (Tobacco) Road From Hypothesis to Conclusion*

▲ Return to Chapter 2: Table of Contents

Answers to Quiz for Module 2.5

1 A
2 D
3 B

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4 C
5 A

VI. KEEPING THE ENTERPRISE ETHICAL (text p. 61)

Learning Objective 2.6.A – Discuss why the principles of informed consent and debriefing are two key characteristics of a researcher's code of ethics.

A. The ethics of studying human beings
   1. People need to give their informed consent to participate in research.
   2. People need to be debriefed regarding their participation when the study is over.

- *Lecture Launcher 2.11: An Historical Perspective on Research Ethics*
- *Lecture Launcher 2.12: Improving Informed Consent*
- *Lecture Launcher 2.13: Do Psychologists Have an Obligation to Do No Harm?*

Learning Objective 2.6.B – List and discuss four reasons why psychologists might use animals in research.

B. The ethics of studying animals
   1. Why study animals?
      a. To conduct basic research on a particular species
      b. To discover practical applications
      c. To clarify theoretical questions
      d. To improve human welfare

- *Lecture Launcher 2.14: Using Animals in Psychological Research*

▲ Return to Chapter 2: Table of Contents

▼ Learning Objectives

After studying this chapter, students should be able to understand the following principles:

What Makes Psychological Research Scientific?

2.1.A – Distinguish between a theory, a hypothesis, and an operational definition. (text pp. 36-37)
2.1.B – Explain why skepticism in science involves more than just disbelief (text p. 37)
2.1.C – Explain why falsifiability is an important component of scientific research. (text p. 38)
2.1.D – Describe why openness and replication are important qualities of the scientific enterprise (text pp. 38-39)

Descriptive Studies: Establishing the Facts

2.2.A – Describe the major ways participants are selected for psychological studies, and why the method of selection might influence interpretations of a study's outcomes. (Text pp. 40-41)
2.2.B – Discuss the advantages and disadvantages of using case studies as a means of data collection. (text pp. 42-43)
2.2.C – Discuss the advantages and disadvantages of using observational methods as a means of data collection. (text pp. 43-44)

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2.2.D – Explain why norms, reliability, and validity are the three key hallmarks of any standardized psychological test. (text pp. 44-45)
2.2.E – Describe the advantages and limitations of using surveys in data collection. (text pp. 46-47))

Correlational Studies: Looking For Relationships

2.3.A – Illustrate with an example how a correlation coefficient gives both the size and direction of the relationship between two variables. (text pp. 48-49)
2.3.B – Explain why a correlation between two variables does not establish a causal relationship between those variables. (text pp. 49-50)

Experiments: Hunting For Causes

2.4.A – Contrast an independent variable from a dependent variable, and give an example of each concept in a psychology experiment. (text pp. 51-53)
2.4.B – Explain the difference between an experimental group and a control group, and discuss how random assignment helps create these two groups (text p. 53)
2.4.C – Explain why single-blind and double-blind procedures are crucial to establishing the soundness of an experiment. (text p. 54)

Evaluating the Findings

2.5.A – Provide an example of how the arithmetic mean and standard deviation could be used to compare the performance of two groups of research participants. (text pp. 56-57)
2.5.B – Explain what a statistically significant research result means to an experimenter. (text pp. 57-58)
2.5.C – Compare cross-sectional and longitudinal studies, and discuss how effect size, metanalysis, and Bayesian statistics allow us to judge the importance of a research outcome. (text pp. 58-61)

Keeping the Enterprise Ethical

2.6.A – Discuss why the principles of informed consent and debriefing are two key characteristics of a researcher's code of ethics. (text pp. 62-63)
2.6.B – List and discuss four reasons why psychologists might use animals in research. (text pp. 63-64)

▲ Return to Chapter 2: Table of Contents

► Rapid Review

Chapter 2 discusses the importance of understanding the methodology of psychological science. The text describes the characteristics of scientific research that should be used to evaluate research findings in psychology and in other fields. Three major types of research studies are described: descriptive studies, correlational studies, and experiments. Descriptive studies include case studies, observational studies, studies based on psychological tests, and studies based on surveys. Correlational studies are a special category of descriptive studies that describe relationships between two variables. Correlational research is useful in making predictions from one variable to another, but not very helpful in determining causality. Experimental research is the only method to determine cause and effect relationships, because it is conducted in a highly controlled fashion. The components of experimental research include manipulating independent variables and measuring dependent variables, as well as randomly assigning participants to experimental and control conditions. Potential biases in conducting research are discussed, as well as

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methods to reduce such bias (e.g., single-blind and double-blind studies). The text explains descriptive and inferential statistics and demonstrates how they help to make research findings meaningful. Finally, the ethical concerns surrounding studying human beings and animals are discussed.

▲ Return to Chapter 2: Table of Contents

▼ LECTURE LAUNCHERS AND DISCUSSION TOPICS

2.1 – How Do We Know What We Know?
2.2 – The Madden Curse
2.3 – From the Lab to the World
2.4 – Online Polls
2.5 – Wundt's Other Method: Historical and Cultural Psychology
2.6 – Correlation and Causality
2.7 – Damned Lies, Damned Statisticians
2.8 – Basic Research vs. Applied Research
2.9 – Size Matters
2.10 – The (Tobacco) Road From Hypothesis to Conclusion
2.11 – An Historical Perspective on Research Ethics
2.12 – Improving Informed Consent
2.13 – Do Psychologists Have an Obligation to Do No Harm?
2.14 – Using Animals in Psychological Research

► Return to Lecture Guide for Chapter 2
▲ Return to Chapter 2: Table of Contents

Lecture Launcher 2.1 – How Do We Know What We Know?

Dependence on observation is one of the hallmarks of science, but it is not the only way humans acquire knowledge. There are, in fact, many questions that cannot be answered by scientific methods and for which other means of acquiring knowledge are more appropriate. Introduce this topic to your students by asking the following questions.

- How do you know that George Washington was the first president of the United States?
- How do you know that you really have a stomach?
- What makes you so sure the sun will rise tomorrow?
- How do you know the color of the shirt I'm wearing?
- How can you be sure that there aren't little creatures inside computers that are responsible for the things computers do?
- Are you sure you don't have a big hole in the back of your pants or skirt?

Authority is one source of knowledge. We know, or believe, that George Washington was the first president because we trust the authority of historians and history books. One prominent example of this occurred during the centuries that Western civilization was dominated by the Church; the authority of holy writings was believed to be the only dependable way of knowing.

Reason was considered by Renaissance scholars to be the most reliable source of knowledge. If you say, "All humans have stomachs; I am human; therefore, I have a stomach," you have used deductive

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reasoning. If you say, "The sun rose today, yesterday, the day before yesterday, and for as long as I or anyone can remember; therefore, the sun will rise tomorrow," you are using inductive reasoning.

Observation is still another way of acquiring knowledge. You know the color of my shirt because you can see the shirt. You assume that you do not have a hole in the posterior of your clothing because you have not observed other people staring at you and giggling.

One might use any of these ways of knowing to deny the existence of little creatures in computers. People you perceive to be authorities about computer innards may have told you how they work. You may have reasoned that creatures need nourishment and there is no food supply inside microprocessors. Or you may have looked inside a computer and failed to see little creatures waiting to solve your problems. But there is no way one can absolutely refute the computer-creature hypothesis; so if you want to keep your computer running, maybe you should find out what the little creatures eat.

All these ways of knowing—authority, reason, and observation--are used by scientists, but observation must be the basis for knowledge that is scientific. Science puts greater emphasis on evidence provided by the senses than on authority of others or reasoning. In short, science relies on empirical evidence.

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Lecture Launchers and Discussion Topics for Chapter 2
▲ Return to Chapter 2: Table of Contents

Lecture Launcher 2.2 – The Madden Curse

The ability to explore alternative explanations for a phenomenon is an important skill for introductory psychology students to develop. People who lack this skill tend to fall prey to mistaken beliefs and superstitions. An interesting example of this is the so-called "Madden Curse." The Madden Curse refers to the tendency for football players featured on the cover of the Madden NFL videogame to perform poorly the following season, sometimes as the result of injury. For example, following his appearance on the videogame's cover, quarterback Daunte Culpepper went from one of the league's best players to struggling with injuries and poor performance. Similarly, Donovan McNabb, Shaun Alexander, Michael Vick, and Troy Polamalu all underperformed or suffered injury after their cover appearances.

Although few people take the Madden curse too seriously, it is a great example of the logical fallacy *post hoc ergo propter hoc* (i.e., one event followed another, therefore, the first event caused the second). In other words, the curse would have it that appearing on the cover *causes* the subsequent decline in performance. Of course, alternative explanations for the phenomenon are seldom considered.

So what are some of the alternative explanations for the Madden Curse? One likely candidate is *regression to the mean*: when a subject with an extreme score is remeasured, it is likely that the score will be less extreme (i.e., closer to average). For example, a person who scores extremely fast on a reaction time task will most likely have a slower time when retested the following week. This can create the illusion that something has affected the person's performance, when regression to the mean is simply the result of having an extreme score to begin with. Because only players who have extremely good seasons are selected for the following year's Madden NFL cover, it is likely that these players will "regress to the mean" and have a less stellar season the following year. Importantly, this does not mean that players featured on the cover are any more likely to have a poor season than other players in the league, but that they are simply unlikely to perform as well as they did the previous season.

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In addition to regression to the mean, another explanation for the Madden Curse is the confirmation bias. The confirmation bias is the tendency for people to pay more attention to evidence that supports their beliefs, and less attention to evidence which contradicts their beliefs. Although it is true that many of the players featured on the Madden NFL cover have fallen victim to the curse, some players have not. For example, linebacker Ray Lewis actually went to the Pro Bowl following his cover appearance. These counterexamples tend to be given less consideration by those who believe in the Madden Curse. Meanwhile, each time a featured player's performance declines, discussion of the curse begins anew.

Altman, A. (2009, April 27). The madden curse. *Time, 173,* (16).
Christensen, L. B. (2004). *Experimental methodology* (9th ed.). Boston, MA: Pearson.

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Lecture Launchers and Discussion Topics for Chapter 2
▲ Return to Chapter 2: Table of Contents

Lecture Launcher 2.3 – From the Lab to the World

Students sometimes have difficulty understanding how general research results can be applied to situations in daily life. The following example provides connections between basic research in sensation and perception and sources of possible military or medical errors.

A number of devices use sound (beeps, clicks, etc.) to provide feedback about bodies, structures, or machines. These sounds are designed to provide information about deviations from a current situation. For example, in medicine, drops in heart rate or blood pressure are signaled with beeps from a monitoring device. Jet pilots receive information regarding the position of their planes in the form of sounds as well. The pupose of these devices is to provide immediate auditory feedback that signals potential problems. The auditory prompts allow a surgeon or pilot to be visually focused on something else at the time.

Unfortunately, research suggests that people often misperceive how sounds change when both their pitch and loudness change (Neuhoff, Kramer, & Wayand, 2002). Rather than noticing the changes immediately and accurately noting the meaning of the changes, individuals may miss the changes entirely or misinterpret them. Because of this misperception, people can't accurately judge the intended meanings of the sounds. Real-world complications that could arise from this problem range from medical mistakes to serious pilot errors. For example, if a pilot does not accurately identify the sounds of the flight system that are designed to alert her to possible mechanical issues, the chances of mechanical failure or crashes may be increased. This result is contrary to the purposes of those feedback systems which are designed to enhance safety. It appears that the assumptions of the developers of these systems regarding the accuracy of human interpretations of the sound may have been incorrect.

Neuhoff, J. G., Kramer, G., & Wayand, J. (2002). Pitch and loudness interact in auditory displays: Can the data get lost in the map? *Journal of Experimental Psychology: Applied*, *8,* 17-25.
Rodstrom, M.A. & Neuhoff, J.G. (2003). Increased pitch increases accuracy of voice identification. *Perceptual and Motor Skills, 97,* 665-70.
Seifritz, E., Esposito, F., Neuhoff, J.G., Di Salle, F. (2003). Sound analysis in auditory cortex: From temporal decomposition to perception. *Trends in Neurosciences, 26***,** 231-232.

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Lecture Launchers and Discussion Topics for Chapter 2
▲ Return to Chapter 2: Table of Contents

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Lecture Launcher 2.4 – Online Polls

News websites such as www.cnn.com and www.foxnews.com frequently poll their visitors on current event topics. A good example of this is when websites ask visitors who they plan to vote for in an upcoming presidential election. The results of these surveys are then posted online. Sometimes, the results of online polls are also publicized in newspapers, on television, or on the radio. After discussing online polls with your students, ask them to respond to the following questions in a class discussion or as a short writing assignment. What are the advantages and disadvantages of collecting survey and opinion poll data online? Why do you think that some critics claim they are misleading?

Sample answer: *Using online surveys is probably a very cost-effective way to collect large amounts of data. However, because only certain people might visit a website, the survey may have a biased sample. For example, people without a lot of money and older adults may not have access to a computer. Also, online polls only survey people who want to visit the website. For example, if the website is for a conservative news organization, then the poll sample won't contain many liberals (and vice versa). If the survey sample is biased, then the results will not reflect the opinions of the general population.*

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Lecture Launchers and Discussion Topics for Chapter 2
▲ Return to Chapter 2: Table of Contents

Lecture Launcher 2.5 – Wundt's Other Method: Historical and Cultural Psychology

An important, although often overlooked, aspect of Wilhelm Wundt's work is his recognition of two kinds of science, and his belief that psychology belongs to both. In German these two sciences are called *Naturwissenschaften* (naturalistic psychology) and *Geisteswissenschaften* (cultural or social psychology). As the historian of psychology, Ernest Hilgard, notes, "in German psychology, the two kinds of science depended upon their distinctive methods." Naturalistic psychology is experimental and follows the methods of physiology, whereas cultural psychology utilizes a historical method and "its substance is the data of cultural residues." Wundt distinguished between questions that were suitable for experimental investigation and those that had to be approached historically, but did not consider these sciences to be mutually exclusive. Rather, "he kept both streams of psychology flowing in the hope of including both in his grand system." Late in his life, between the years 1900 and 1920, Wundt published a 10-volume work in *Volkerpsychologie* (historical-cultural psychology) using the historical method, and included were discussions of language, myth, art, morals, social customs, and laws.

Hilgard notes that in American psychology, there is a long, although muted, history of debate between idiographic and nomothetic science. He writes that this debate "is in some respects parallel to Wundt's distinction between problems that were suitable for experimental investigation and those which had to be approached historically." Science that seeks general laws, using quantitative and experimental methods, is described as nomothetic, whereas the idiographic approach, using the methods of history and biography, attempts to understand particular events in nature or society.

Gordon Allport is perhaps the best known spokesperson of the idiographic approach. He believed that the individual personality was unique and that a psychology of personality must necessarily be idiographic. Existential and phenomenological psychologists have also argued for the historical method. More recently, however, with the emergence of social constructionism as a growing influence in the field and the increasing recognition of the need to understand behavior within its unique historical and cultural context, Wundt's second science seems to be gaining importance. History seems to be proving Wundt correct in his understanding that psychology must include *both* methods.

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Psychology 12th edition Wade Solutions Manual

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Lecture Launchers and Discussion Topics for Chapter 2
▲ Return to Chapter 2: Table of Contents

Lecture Launcher 2.6 – Correlation and Causality

There seems to be a general human tendency to attribute causality to correlated events. Laypeople, like psychologists, often impose patterns of (apparently) lawful regularity on observed events. Given what is perceived as an "effect," we search for causes. Events are more likely to be singled out for attention and analysis when they are unusual, anomalous, and discontinuous with our prior experience. When such events are natural phenomena, they are typically relegated to the status of "cause" and then the search is directed toward their aftereffects.

One of the most persistent instances in which pseudo-correlations of behavioral consequences are reported to flow from salient natural and human events is the "baby boom" syndrome. For example, the allegation of increased birthrate nine months after a major power blackout in New York is well known, as is the baby boom in Israel nine months after their war with Egypt.

Invariably, when base rate data are used to compare the assumed "increase in births," the effect vanishes. That is, when seasonal fluctuations in births are taken into account, there is no unusual effect left to relate to the nine-months-earlier unusual event. But that does not deter the correlation seekers. Three University of North Carolina sociologists attributed a 1955 drop in Southern birth rates to the Supreme Court's 1954 school desegregation decision (Rindfuss, Reed, & St. John, 1978). They theorized that uncertain prospects for the future "demoralize"' prospective parents (both whites and, to a lesser extent, blacks), causing them to postpone any children they might otherwise have conceived in the three- or four-month period immediately following the decision. The subsequent recovery in the birth rate is attributed to the realization that desegregation would in fact proceed slowly.

Rindfuss, R. R., Reed, J. S., & St. John, C. A. (1978). A fertility reaction to a historical event: Southern white birthrates and the 1954 desegregation ruling. *Science, 201*, 178-180.

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Lecture Launchers and Discussion Topics for Chapter 2
▲ Return to Chapter 2: Table of Contents

Lecture Launcher 2.7 – Damned Lies, Damned Statisticians

Joel Best has written an excellent book examining the misuse and abuse of statistics, especially those asserted in the public forum and used for social and political decision making. The book is a great source of lecture ideas and demonstrations; an anecdote from the introduction will illustrate the kind of material you might draw from.

Best served on the dissertation committee of a student who asserted the following claim in the first sentence of her or his dissertation prospectus: "Every year since 1950, the number of American children gunned down has doubled." This dramatic statistic certainly attracts attention and would seem to call for strong, unambiguous, immediate legislation of all sorts. But as Best points out, there's a certain stink hanging over this claim. Let's say, for example, that in 1950 only one child was gunned down in America. That would mean that in 1951 two children were gunned down, in 1952 four children were gunned down, in 1953 eight children were gunned down, and so on. If this statistic were accurate, by 1965 there would

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Psychology 12th edition Wade Solutions Manual

have been 32,768 children gunned down (Best notes that FBI statistics for 1965 revealed only 9,960 criminal homicides of *any* kind in the entire country). By 1970 the number of deaths would have passed 1 million, and by 1980 it would have passed 1 billion. By 1983 there would have been 8.6 billion gunned down children (more than twice the population of the planet at that time), and by 1995, when this student made this assertion, the number of American children gunned down would have been *35 trillion*…a staggering statistic indeed, but for a very different reason!

A little digging by Best revealed the error of the student's ways. The statement was harvested verbatim from a published article in a journal in the student's field, but the original statement was made by the Children's Defense Fund. However, the original statement read, "The number of American children killed each year by guns has doubled since 1950." Notice that this is a very different statement with a very different meaning: In 1994 the number of children "gunned down" was twice what it was in 1950. Some creative license on the part of the article's authors (and the student's lifting of it) led to the combinatorial confusion revealed by Best.

But there's more to the story. As Best points out, the population of the United States also rose between 1950 and 1994, by about 73 percent. We might therefore expect all kinds of events to increase, including the number of childhood fatalities. Because the population had nearly doubled, the number of childhood shootings (and number of cars purchased, and children born, and television sets bought, and books written, and any number of things) might indeed have seemed to increase just because there were more people. Moreover, there's some fuzziness about the claim itself. "Child" is a little sticky, given that some Children's Defense Fund statistics include anyone under the age of 25. Also, "died by gunshot" could include suicides and accidents as well as homicides. Finally, it's not clear who has compiled the information on these childhood deaths, or how the counting was done.

Unfortunately, there are more than enough of these types of statistical missteps that you can share with your students. Use these examples to stress the importance of critical thinking and a keen evaluation of dubious claims.

Best, J. (2001). *Damned lies and statistics*. Berkeley, CA: University of California Press.

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Lecture Launchers and Discussion Topics for Chapter 2
▲ Return to Chapter 2: Table of Contents

Lecture Launcher 2.8 – Basic Research vs. Applied Research

For 2010, almost 1.5 billion dollars were appropriated by Congress for The National Institute of Mental Health (NIMH). The money budgeted to the NIMH is used to fund psychology research around the country. In broad terms, these research projects can be divided into two categories: basic and applied. The goal of basic research is simply to expand our understanding and increase our knowledge. For example, a basic research project sponsored by the NIMH may study the function of a single protein in the brain to figure out what it does. The goal of applied research, on the other hand, is to solve a particular problem, such as developing pharmaceutical agents to treat depression. How much taxpayer money should go to basic versus applied research can be a contentious issue. Some feel that basic research wastes money pursuing "knowledge for knowledge's sake," and that this money would be put to better use developing treatments for psychological and neurological problems. Supporters of basic research argue that practical treatments often arise from the knowledge gained from basic research, and that applied researchers wouldn't know where to begin if not for basic research.

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Psychology 12th edition Wade Solutions Manual

After introducing students to the debate over funding for basic versus applied research, ask for volunteers to share their opinions with the class. How would they distribute the NIMH budget? As students discuss the issue, you may want to pose the following questions: When Congress appropriates funds to the NIMH, should they be allowed to specify what percentage goes to basic or applied research? Can the United States afford to fund research that may have no clear benefit to society? What role does serendipity play in scientific discovery? Make sure students come away from the lesson with an understanding of the importance of both types of research.

FY 2010 budget. Retrieved November 20, 2009, from, http://www.nimh.nih.gov/about/budget/cj2010.shtml

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Lecture Launchers and Discussion Topics for Chapter 2
▲ Return to Chapter 2: Table of Contents

Lecture Launcher 2.9 – Size Matters

It doesn't take much instruction in statistical reasoning or research methods to learn that larger samples are usually better than smaller ones, for all kinds of reasons. However, this this maxim is sometimes ignored, even in professional publications.

Judy Langlois, of the University of Texas at Austin, and her students investigated a case in which sample size makes an important difference in interpreting research outcomes. Research on facial attractiveness has often revealed that masculine male faces are more attractive than feminine male faces (Cunningham, Barbee, & Pike, 1990; O'Toole et al., 1998). Other researchers, however, have shown that feminine male faces are more attractive than masculine male faces (Perrett et al., 1998). Both sets of investigators have offered cogent explanations for their findings, but Langlois and her colleagues suspected that sample size may account for the contradictory results.

The researchers gathered attractiveness ratings and masculinity/femininity ratings for 150 men's faces and 147 women's faces. They then bootstrapped (i.e., resampled with replacement) the correlation between attractiveness and masculinity/femininity for every possible sample size from N=3 to N=150. This produced a sampling distribution of correlation coefficients, or, in other words, a large comparison distribution against which to evaluate other results.

The researchers then examined the literature on the issue of facial attractiveness and converted appropriate findings to effect sizes. This allowed them to compare the effect sizes reported in previous findings with the effect sizes generated by their sampling distribution. In cases in which the probability of a published study's effect size was less than .025 of coming from the generated sampling distribution, it could be concluded that the published study's results were significantly different. Among the findings revealed by these procedures was this: At large sample sizes (50 faces and above) the variance among the possible correlations is fairly stable, but at smaller sample sizes (fewer than 30 faces) there is a bias to obtain inaccurately high correlations. In short, sample size can account for much of the variation seen in studies of the relationship between masculinity and attractiveness in men.

Bronstad, P. M., Ramsey, J. L., & Langlois, J. H. (2002). Sample size explains discrepancies in facial attractiveness research: Masculine male faces are more attractive. Poster presented at the 12th Annual Convention of the American Psychological Society, New Orleans, June 2002.

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Psychology 12th edition Wade Solutions Manual

Cunningham, M. R., Barbee, A. P., & Pike, C. L. (1990). What do women want? Facialmetric assessment of multiple motives in the perception of male facial physical attractiveness. *Journal of Personality and Social Psychology, 59*, 61-72.

O'Toole, A. J., Deffenbacher, K. A., Valentin, D., McKee, K., Huff, D., & Abdi, H. (1998). The perception of face gender: The role of stimulus structure in recognition and classification. *Memory and Cognition*, *26*, 146-160.

Perrett, D. I., Lee, K. J., Penton-Voak, I. S., Rowland, D., Yoshikawa, S., Burt, D. M., Henzi, S. P., Castles, D. L., & Akamatsu, S. (1998). Effects of sexual dimorphism on facial attractiveness. *Nature*, *394*, 884-887.

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Lecture Launchers and Discussion Topics for Chapter 2
▲ Return to Chapter 2: Table of Contents

Lecture Launcher 2.10 – The (Tobacco) Road from Hypothesis to Conclusion

Here's what might seem like an unusual question to ask your current students: How do we know that cigarette smoking is dangerous to one's health? What's (hopefully) taken for granted these days was not always the case. In fact, like most testable questions, hypotheses needed to be developed, evidence needed to be gathered, and conclusions needed to be derived. Here's a short version of how that happened in the case of smoking and illness.

Cigarette smoking became common in Europe after French and British soldiers picked up the habit from Turkish soldiers during the Crimean War of 1854 to 1856. The habit was adopted by a few Americans in the next 30 or 40 years. In those days, the tobacco was strong and smokers rolled their own cigarettes. More American males began to smoke after the automatic cigarette-making machine was perfected in North Carolina in the 1880s. Very few women smoked, at least in public, until after World War I, when U.S. tobacco companies began to target women with their advertising.

People must have suspected that cigarettes were dangerous to health long before any research was done. The slang term for cigarettes, "coffin nails," was used during the first half of the 20th century. The conjecture became a hypothesis when doctors noticed that many people who died of lung cancer had been heavy smokers, and it was also suspected that nicotine affects the circulatory system. Early studies produced strong negative correlations between cigarette smoking and age at death: The more people smoked, the younger they were when they died.

These correlational data resulted in the first warning labels on cigarettes in the 1960s: "Caution: The Surgeon General has determined that cigarette smoking may be hazardous to your health." Notice that the warning reads "may be hazardous," rather than "*is* hazardous." The conservative warning is all that was justified by correlational data: The earlier death of smokers could be for reasons other than cigarette smoking. Perhaps smokers live more stressful lives, and both the smoking and their illness are the result of stress. Also, it is possible that smokers are not as mindful of their health in other ways as nonsmokers; maybe they don't exercise or have nutritious diets. Or perhaps both the smoking and the mortality have a genetic basis.

To do a definitive experiment on the effects of smoking, one would need to get a sizeable sample of young people who have never smoked and use matched random assignment to place them in either a smoking group or a nonsmoking group. The smokers would smoke at least one package of cigarettes a day for life, beginning at age 14, and the nonsmokers would not smoke at all. The dependent variable is age at death, and the successors of the original researchers could not analyze the data until all the

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Psychology 12th edition Wade Solutions Manual

participants had died. If the nonsmokers lived significantly longer, the researchers would be justified in concluding that cigarette smoking *is* hazardous to health.

Although an experiment like this has not been done, and probably never will be done, in the 1970s the label on cigarette packages nonetheless was changed to read, "Cigarette smoking is dangerous to your health." The evidence that prompted this change came from several sources. One source was studies that tried to match smokers and nonsmokers on various alternative causes, such as stress, and thus to control for its effects on health. Another source of evidence came from animal studies. The conclusion that cigarettes are truly "coffin nails" is based on large amounts of data and a multitude of studies.

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Lecture Launchers and Discussion Topics for Chapter 2
▲ Return to Chapter 2: Table of Contents

Lecture Launcher 2.11 – An Historical Perspective on Research Ethics

When discussing the ethical treatment of human research participants several "classic" studies, which would be ethically questionable by today's standards, serve as examples. For instance, many instructors discuss Stanley Milgram's studies of obedience, Philip Zimbardo's prison simulation, or Stanley Schachter's studies of autonomic arousal and attribution. Students often have mixed reactions to these examples. Some find them relatively innocuous, whereas others have strong reactions to the treatments participants were asked to endure. The fact that such studies took place within relatively recent times compounds the issue. Some students see these 1960s experiments as long ago and of a different time, whereas others see them as examples of the unethical treatment psychologists still foist on people to this day.

To provide a context for these types of issues, your students might be interested in hearing about older examples of ethically questionable research. For example, Carney Landis, a noted psychologist of the 1920s and 1930s, conducted a series of studies dealing with the experience and expression of emotion. In one set of studies he was particularly interested in capturing facial expressions of emotion, and used strong elicitors of emotion to produce them. For example, one situation involved dropping a lit firecracker underneath an unsuspecting subject's chair, whereas another involved showing participants pornographic (for their day) photographs and photos of horribly disfiguring skin diseases.

Although these manipulations may seem harsh, Landis used stronger ones as well. For example, participants were instructed in one situation to plunge their hand into a pail of shallow water that, unbeknownst to them, contained 3 live frogs. (This manipulation was presumably used to evoke disgust.) To quote Landis, however..."After the subject had reacted to the frogs the experimenter said, 'Yes, but you have not felt everything yet, feel around again.' While the subject was doing so he received a strong...shock from an induction coil, attached to the pail by concealed wiring."
And for the *coup de grâce*:

> "The table in front of the subject was covered with a cloth. A flat tray and a butcher's knife were placed on the cloth. A live white rat was given to the subject. He (sic) was instructed, 'Hold this rat with your left hand and then cut off its head with the knife.'...In five cases where the subjects could not be persuaded to follow directions the experimenter cut off the head while the subject looked on."

Mention is also made of a final experiment involving shock which "...varied from a just noticeable intensity to a strength which caused the subject to jump from the chair," as well as other studies. Landis'

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Psychology 12th edition Wade Solutions Manual

participants, in passing, included graduate students, a stenographer, a school teacher, and a thirteen-year-old boy with high blood pressure.

Although Landis has been singled out for examination here, there certainly is no lack of experiments from the 1920s through the 1960s work mentioned above that can provide examples of ethically dubious research. Discussing such studies, especially in light of current APA standards, should produce spirited discussion among your students.

Landis, C. (1924). Studies of emotional reactions II: General behavior and facial expression. *Comparative Psychology*, *4*, 447-509.

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Lecture Launchers and Discussion Topics for Chapter 2
▲ Return to Chapter 2: Table of Contents

Lecture Launcher 2.12 – Improving Informed Consent

Informed consent is one of the hallmarks of the ethical treatment of research participation. But for some participants, reviewing information about a study and agreeing to participate may not be the seamless act we assume it to be. In particular, considerable concern has been raised over the ability of individuals with severe psychological disturbances to fully appreciate the risks and benefits of their research participation. One study, however, suggests that some techniques may boost patients' understanding of their role in the research process.

A team of investigators led by psychiatrist Donna A. Wirshing of the West Los Angeles Veterans Affairs Medical Center recruited 49 patients diagnosed with schizophrenia and who were already participating in clinical trials of several antipsychotic medications. The patients were read an informed-consent document that presented information about an upcoming clinical trial, then were given a survey designed to gauge how well they had understood what they heard. The survey asked about the study's goals and procedures, as well as the patients' options as potential participants, the responsibilities of the physicians, and any potential side effects of the antipsychotic medication being tested. Five patients answered all of the survey questions correctly. The researcher immediately explained any items that were answered incorrectly to the remainder of the patients and readministered the survey. Twenty-six patients correctly answered all items on the second pass, and eighteen patients did so after three or more attempts. Importantly, all patients answered the majority of questions correctly when tested one week later, including those patients with the most severe thought disturbances and hallucinations.

These results suggest that relatively simple procedures can be enacted to assure that informed research participation really is informed. They also suggest that with a collaborative effort between the researcher and potential participant, even those individuals plagued by severe psychological disturbances can more fully appreciate their contributions to research.

Bower, B. (1998, December 5). Schizophrenia: Consenting adults…*Science News, 154,* 367.

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Lecture Launchers and Discussion Topics for Chapter 2
▲ Return to Chapter 2: Table of Contents

Lecture Launcher 2.13 – Do Psychologists Have an Obligation to Do No Harm?

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In the years following the September 11, 2001 terrorist attacks, the U.S. military and the CIA used controversial interrogation techniques on suspected terrorists in an attempt to gain information and prevent future attacks. These techniques—which some people view as torture—included stress positions, water-boarding, and extreme sleep deprivation. Especially disturbing to some is the fact that psychologists participated in these interrogation programs. This raises the ethical question of whether psychologists have a professional obligation to "do no harm," or whether psychologists have a higher obligation to help protect the public from terrorist attacks. In 2005, the American Psychological Association (APA) adopted the position that psychologists could, in fact, work as interrogation consultants with national security and military agencies. Many members, however, felt that position was inconsistent with APA principles, and more recent resolutions have banned psychologists from participating in interrogations which use specific controversial techniques like forced nudity and exploiting the phobias of prisoners.

Discuss this topic with your class and encourage students to share their opinions. Some interesting questions to stimulate the discussion are: If the interrogation techniques are shown to yield unreliable information, does that affect your decision on whether psychologists should be allowed to participate? What if interrogations are shown to yield useful information that can save lives? What if the psychologist's primary role is to make sure the interrogation does not permanently damage the suspect? Alternatively, you may want to divide the class into groups, and then have each group develop an argument for or against allowing psychologists to participate in interrogations. Each group could then elect a spokesperson to debate the issue in front of the class.

Munsey, C. (2008). The debate continues: Psychologists continue to discuss the field's involvement in interrogations. *Monitor on Psychology, 39*(9), 16.

Vedantam, S. (2007, August 20). APA rules on interrogation abuse: Psychologists' group bars member participation in certain techniques. *Washington Post.* Retrieved on November 21, 2009, from http://www.washingtonpost.com/wp-dyn/content/article/2007/08/19/AR2007081901513.html

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Lecture Launchers and Discussion Topics for Chapter 2
▲ Return to Chapter 2: Table of Contents

Lecture Launcher 2.14 – Using Animals in Psychological Research

A controversial issue in psychology, and in many other fields of study, involves the use of animals in research. Is it ethical to subject animals to unnatural and/or painful situations in the pursuit of knowledge about the human condition? You might present students with some additional information about the use of animals in psychological research and the nature of the debate.

Psychologists who study animals are sometimes interested in comparing different species or hope to learn more about a particular species. Their work generally falls into the area of basic science, but often it produces practical benefits. For example, using behavioral principles, farmers have been able to reduce crop destruction by birds and deer without resorting to their traditional method--shooting the animals. Other psychologists are primarily interested in principles that apply to both animals and people. Because many animals have biological systems or behavioral patterns similar to those of human beings, using animals often allows more control over variables than would otherwise be possible. In some cases, practical or ethical considerations prevent the use of human beings as subjects. By studying animals, we can also clarify important theoretical issues. For example, we might not attribute the greater life expectancy of women solely to "lifestyle" factors and health practices if we find that a male-female

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difference exists in other mammals as well.

As the text points out, those who support the use of animals in research argue that animal studies have led to many improvements in human health and well-being. In recent years, however, animal research has provoked angry disputes over the welfare of animals and even over whether to do any animal research at all. Much of the criticism has centered on the medical and commercial use of animals, but psychologists have also come under fire. Critics of animal research have pointed to studies that produce no benefits for human beings but involve substantial harm to the animals being studied. A few years ago, for instance, a Maryland psychologist studying the nervous system was convicted of cruelty to animals after he cut the nerve fibers controlling limb sensation in 17 monkeys. The purpose of his research was to find ways to restore the use of crippled limbs in stroke victims. The charges alleged abusive treatment of the animals. The psychologist's conviction was eventually reversed on appeal, but by then the government had withdrawn its funding of the project.

People have staked out extreme positions on both sides of this debate. The controversy has often degenerated into vicious name-calling by extremists on both sides. Some animal rights activists have vandalized laboratories, and threatened and harassed researchers and their families; some scientists have unfairly branded all animal welfare activists as terrorists (Blum, 1994). A more positive result of the debate has been the close examination of the American Psychological Association's ethical code for the humane treatment of animals and the passage of stricter federal animal welfare regulations governing the housing and care of research animals. Most psychological organizations, however, oppose proposals to ban or greatly reduce animal research. The APA and other organizations feel that protective legislation for animals is desirable but must not jeopardize productive research that increases scientific understanding and improves human welfare.

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Lecture Launchers and Discussion Topics for Chapter 2
▲ Return to Chapter 2: Table of Contents

▼ CLASSROOM ACTIVITIES, DEMONSTRATIONS, AND EXERCISES

2.1 – Are Psychologists Scientists?
2.2 – Inference or Observation?
2.3 – Operational Definitions of Handedness
2.4 – Which Method Would You Use?
2.5 – Can Science Answer This Question?
2.6 – Name That Research Method
2.7 – Making Statistics Relevant
2.8 – Observational Research in the Dining Hall
2.9 – Understanding Correlations
2.10 – Correlating Shoe Size and Height
2.11 – Wonder Horse Dials 911 to Save Boy's Life
2.12 – Softens Hands While You Do Dishes
2.13 – Testing Random Assignment
2.14 – Promoting Cultural Awareness

▲ Return to Lecture Guide for Chapter 2

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Psychology 12th edition Wade Solutions Manual

Activity 2.1 – Are Psychologists Scientists?

Before introducing students to the various subfields of psychology, make the point that all psychologists, regardless of their area of expertise, are indeed scientists. This brief exercise (adapted from Smith, 1982) also illustrates students' stereotypical view of psychologists as clinicians. First, write the word "psychologist" on the board and ask students to describe some characteristics and traits of the typical psychologist. With encouragement to freely answer with any words or images that come to mind, the following responses frequently come up: caring, patient, warm, lying on a couch, soothing, good listener, giving advice, etc. After erasing these responses, write the word "scientist" on the board and ask students to do the same for the typical scientist. Their responses clearly indicate that their perceptions of "scientists" (which include traits like analytical, brilliant, and achieving, and images of conducting research and wearing lab coats and pocket protectors) are markedly different from their perceptions of "psychologists." Near the end of in the exercise, a few students will invariably catch on and ask, "But aren't psychologists scientists?" which leads the class into a discussion of why their perceptions are so divergent. By this time, the idea that psychologists are *scientists* that study the mind and behavior rather than genes, chemicals, or subatomic particles makes perfect sense, and you can then describe cognitive psychologists as *scientists* who study human mental processes, developmental psychologists as *scientists* who study changes in capacities throughout the lifespan, and so on.

Smith, G. (1982). Introducing psychology majors to clinical bias through the adjective generation technique. *Teaching of Psychology*, *9*, 238-239.

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Classroom Activities, Demonstrations, and Exercises for Chapter 2
▲ Return to Chapter 2: Table of Contents

Activity 2.2 – Inference or Observation?

Copy and distribute **Handout Master 2.1** to students. This review exercise asks students to decide whether each of 14 statements is strictly objective or whether it includes an inference made by the observer.

Answers:

1. Observation
2. Inference
3. Inference
4. Observation
5. Inference
6. Inference
7. Inference
8. Observation
9. Inference
10. Observation
11. Inference
12. Inference
13. Observation
14. Observation

► Return to Lecture Guide for Chapter 2

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Psychology 12th edition Wade Solutions Manual

◄ Return to complete list of Classroom Activities, Demonstrations, and Exercises for Chapter 2
▲ Return to Chapter 2: Table of Contents

Activity 2.3 – Operational Definitions of Handedness

The student handout for this exercise is included as **Handout Master 2.2**. Approximately 90 percent of the human population is right-handed; the remainder is left-handed. One fact revealed in handedness research is that most individuals are not as strongly right- or left-handed as they think. To demonstrate this point, ask students whether they use their right or left hands to complete each of the following tasks. Students are to indicate frequency on a five-point scale: (1) Always left, (2) Usually left, (3) Equally left and right, (4) Usually right, (5) Always right.

1. To write a letter legibly.
2. To throw a ball at a target.
3. To hold scissors to cut paper.
4. To deal playing cards.
5. To hold a toothbrush while cleaning teeth.
6. To unscrew the lid of a jar.

Now have students perform a different measure of handedness. The second page of **Handout Master 2.2** contains two separate sets of boxes arranged sequentially with 100 quarter-inch boxes in each set, one set of boxes on the top of the page and one set on the bottom. Now have the students take their pencils in hand. At the word "go," students are to tap each box in the top set in sequence from left to right using their ***right*** hands. After 30 seconds, signal "stop." Give a 30-second rest period. Now have students tap the boxes in the bottom set using their ***left*** hands, again for 30 seconds. Have students score the taps; pencil marks must appear inside the box; marks on the lines do not count.

The hand with the higher score is defined as the dominant hand. Students can now compare the two measures of handedness and discuss the degree of consistency between the two. If the two measures differ, which measure do they believe gives the more accurate assessment of their handedness? Why? Note that one measure is a self-report questionnaire, whereas the other involves skilled performance.

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Classroom Activities, Demonstrations, and Exercises for Chapter 2
▲ Return to Chapter 2: Table of Contents

Activity 2.4 – Which Methods Would You Use?

The following examples can be used to generate a discussion of the research methods used by psychologists. Write the following methods on the board: Case histories, naturalistic observation, laboratory observation, surveys, tests, correlational studies, and experiments. Then, for each situation, ask students to decide which method is appropriate and briefly describe why.

1. Determining the favorite food of adolescents
   Method: Survey
   Explanation: Adolescents constitute a large population and the information sought should be accessible through questionnaires or interviews. Care will be needed to construct a sample that is representative of the population under consideration.

2. Determining whether a person is introverted or extroverted

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Psychology 12th edition Wade Solutions Manual

Method: Psychological test

Explanation: The goal is to measure psychological qualities within an individual. Other methods (e.g., case history, naturalistic observation) might be employed, but they are more time-consuming and do not offer the degree of standardization, reliability, and validity found in a well-constructed test.

3. Determining if frustration causes aggression
   Method: Experiment
   Explanation: Cause-and-effect information is being sought. In science this information is obtained through experimentation in which the proposed causal variable is manipulated under controlled conditions.
4. Determining if level of education is associated with crime
   Method: Correlation
   Explanation: This technique is used to determine if and how strongly two variables are related. Establishing that a correlation exists, however, does not address the problem of why two things are related.
5. Determining how teenagers behave on their first date
   Method: Naturalistic observation
   Explanation: A description of behavior as it occurs in a real-life situation is being sought. Making the observations without arousing suspicion in subjects could be problematic.
6. Determining the behavior of people who are anxious about participating in research
   Method: Laboratory observation
   Explanation: The goal here can be readily achieved within an environment artificially set up by the experimenter. The advantage of this approach is that the investigator has greater control over the situation being studied.
7. Determining why a stay at home Mom gave up a flourishing career
   Method: Case history
   Explanation: Making this determination requires in-depth information about the way a variety of psychological factors, expectations, values, motives, past experiences, and so forth, blend together within the person. This kind of information is unique to the person and could not be assessed through standardized tests.

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Classroom Activities, Demonstrations, and Exercises for Chapter 2
▲ Return to Chapter 2: Table of Contents

Activity 2.5 – Can Science Answer This Question?

In this exercise, students are asked to identify whether specific questions can be addressed using the methods of science. The student handout is included as **Handout Master 2.3.** Suggested answers and explanations are listed below.

1. No. The question as stated is vague and the terms are not defined. What does "bad" mean? (Good and bad are value judgments.) Who or what is "society"? Bad for whom? However, specific correlates and consequences of abortion can be studied.

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2. Yes. The independent variable would be "before or after eating" and the dependent variable would be talkativeness, which could be operationally defined (e.g., as the length of replies to questions).
3. Yes, so long as the variables are operationally defined. The independent variable would be jogging versus not jogging (or perhaps the frequency or duration of jogging); the dependent variable would be some measure of mental attitude, such as scores on a psychological test.
4. Yes. This question requires only the computation of a correlation between doctors' GPAs in medical school and their subsequent incomes. Such variables as "years in practice" would have to be controlled and a representative sample would have to be selected.
5. No, probably not; it would be a little like comparing apples and oranges. Physiological measures of emotional strength would not be useful because there is not always a relationship between physiological arousal and subjective experience, and because love tends to be a more enduring emotion than anger.
6. Yes. The independent variable would be "bottle-fed versus breast-fed." The dependent variable would be alertness, which would have to be operationally defined in behavioral terms. If babies were randomly assigned to the two groups, the study would be an experiment. If the researcher used babies whose mothers had already made the decision about feeding method, the study would be correlational, and inferences about cause and effect could not be made.
7. No. "Moral" is a broad, vague term that means different things to different people. Moreover, many unanticipated economic, political, and social developments could affect the outcome. Even if "moral" could be defined adequately, and projections from current trends and conditions could be made, the results might turn out to be meaningless, because definitions of morality change over time. What is "moral" right now might not be moral in 2020, and vice versa.
8. No. The participants would be unavailable for follow-up.

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Classroom Activities, Demonstrations, and Exercises for Chapter 2
▲ Return to Chapter 2: Table of Contents

Activity 2.6 – Name That Research Method

In this exercise, students are asked to match brief descriptions of research with the name of the method being used. Copy **Handout Master 2.4** and distribute to students as a basis for this exercise.

Answers: 1-c, 2-a, 3-e, 4-f, 5-d, 6-b.

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Classroom Activities, Demonstrations, and Exercises for Chapter 2
▲ Return to Chapter 2: Table of Contents

Activity 2.7 – Making Statistics Relevant

Statistics can be demystified if you use data gathered from your own students in your presentation of statistical concepts. This requires a little advance planning on your part, so you can have data analyzed by the time you are discussing statistics, but the results are generally worth it.

Several class meetings before you plan to discuss statistics, have students complete the **Student Data**

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Sheet, which is included as **Handout Master 2.5**. Emphasize that it is important that students furnish all of the information requested. Students should not put their names on the data sheets. Collect the data sheets and enter the data into a spreadsheet or statistical program. If you are using a spreadsheet program such as Excel, each row represents data for one student; each column contains one type of data.

Sex	Height	Shoe Size	Exercise	Stress	Depression	Anxiety
m	73	11	10	2	2	1
f	65	8	10	3	1	3

After the data are entered, you can compute various types of analyses and construct graphs from the data. (Correlations and t-tests may be computed in Excel using the *Data Analysis* tools, which are available as add-ins under *Tools* on the menu bar.) Using a spreadsheet or statistical program, it is easy to calculate many correlation coefficients. Construct graphs of the relationships that are most interesting, surprising, or absurd. Before presenting the data, ask students to predict the nature and strength of various correlations (e.g., height versus shoe size, exercise versus depression, shoe size versus stress). As you present the data to the students, remind them of how the data were generated; this will help them to focus on the *meaning* of the correlational relationships you are discussing.

Students are also typically interested in statistics relevant to gender differences. Calculate averages for males versus females in all categories of data (e.g., mean height for males versus females; mean shoe size; mean depression levels). Present means for males and females for various categories. Ask students to predict whether the differences are *statistically significant*. If possible, run t-tests on the data to determine *p* values and present these to the class to confirm or disconfirm their predictions. Male-female differences in height and shoe size are typically statistically significant. Gender differences in other variables are less consistent. Again, choose comparisons that are especially interesting or surprising to present to the class.

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Classroom Activities, Demonstrations, and Exercises for Chapter 2
▲ Return to Chapter 2: Table of Contents

Activity 2.8 – Observational Research in the Dining Hall

Koschmann and Wesp (2001) provide several research activities for observational research, correlational research, and experimental research. One way to introduce students to research methods is to allow them to become more cognizant of their everyday surroundings and fellow classmates' behaviors. Koschmann and Wesp suggest that the college or university dining hall is an excellent "laboratory" to observe human behavior. Merely ask students to observe others during meals in the cafeteria, such as seat selection or food choices. You might encourage student research teams to decide which behaviors they wish to observe. Ask students to record their observations, maintain confidentiality, and "debrief" anyone who asked them what they were doing. During the next scheduled class, ask students to share their findings and to generate discussion about potential hypotheses that may provide a better understanding of the behaviors they observed.

Koschmann, N. & Wesp, R. (2001). Using a dining facility as an introductory psychology research laboratory. *Teaching of Psychology, 28*, 105–108.

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Classroom Activities, Demonstrations, and Exercises for Chapter 2
▲ Return to Chapter 2: Table of Contents

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Activity 2.9 – Understanding Correlations

This exercise on correlations can be used as a classroom demonstration or as a take-home assignment following a lecture on the nature and uses of correlations. The student handout for this exercise is included as **Handout Master 2.6**. Suggested answers are provided below; however, there are other reasonable explanations.

1. *Positive*. Mutual influence. Similar life experiences.
2. *Negative*. Orphanage environment has an adverse effect on cognitive development. Intelligent children are more likely to be adopted.
3. *Positive*. Violent pornography stimulates violent behavior. Both the violent crime and the number of stores are related to the size of cities. Violent criminals are attracted to violent pornography.
4. *Negative*. Absent students miss pearls of wisdom from the mouth of the instructor. Students with jobs or other responsibilities find it difficult both to get to class and to find time to study.
5. *Positive*. The money appropriated to control crime was poorly spent. The city grew during the eight years, resulting in more crime and more tax revenues.
6. *Positive*. Both variables are related to socioeconomic factors; children from affluent homes have both intellectual and physical advantages over children from substandard home environments. Age is the third variable that accounts for scores on both variables; older children have bigger vocabularies and are also stronger and better coordinated.

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Classroom Activities, Demonstrations, and Exercises for Chapter 2
▲ Return to Chapter 2: Table of Contents

Activity 2.10 – Correlating Shoe Size and Height

Objective: To provide students with an opportunity to collect, graph, and analyze data and explore the concept of correlation.

Materials: tape measure; graph paper; a computer running Microsoft Excel or statistical software (optional)

Procedure: Preparation: Begin by reviewing correlations, correlation coefficients, and scatter plots with students. Then ask each student to write a hypothesis about the relationship between shoe size and height for the class. Remind students that their hypothesis should describe both the *direction* and *strength* of the relationship. Data Collection: Before beginning the data collection, explain to students that all height data should be recorded in inches. Also explain that, because men's and women's shoe sizes are measured differently in the United States and Canada, they should add 1½ to all of the men's shoe sizes to convert them to the equivalent women's shoe size. Next, have students collect shoe size and height data from the class. For larger classes, you may want to divide the class into smaller groups, with each group collecting and graphing their own set of data. Alternatively, demonstrate the process of random sampling by choosing the names of approximately 20–30 students "out of a hat" and then record their heights and shoe size on the board. A tape measure should be available for students in case some students do not known their own height. Importantly, remind the class that each student's height must remain paired with that same student's shoe size, otherwise it will not be possible to assess the relationship between the two variables. Analysis: After the data have been collected, students should work together as a class or in

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groups to create a scatter plot. Remind students to consider the range of the data values when choosing appropriate scales and ranges for the plot's axes. After the data have been plotted, have students discuss the relationship between the two variables. Ask students to estimate the correlation coefficient based upon the scatter plot and compare it to their original hypothesis. Depending on the data set, reasonable estimates will probably range from +0.3 to +0.8. If a computer is available, the actual correlation coefficient can be easily calculated by entering the data into an excel spreadsheet and then using the CORREL function.

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Classroom Activities, Demonstrations, and Exercises for Chapter 2
▲ Return to Chapter 2: Table of Contents

Activity 2.11 – Wonder Horse Dials 911 to Save Boy's Life

Jane Halonen suggests a fun class exercise that tests students' understanding of experimental methodology principles. After you have covered the basics of correlation, experimentation, and causal inference, challenge your students to apply these principles by examining the outrageous claims made in tabloid headlines, many of which imply a causal relationship (e.g., dreaming in black-and-white improves your sex life; garlic diet improves memory...but not breath; large gopher presence precedes volcano eruptions). For this exercise, bring in a variety of headlines from the *Star*, *National Enquirer*, *Weekly World News*, *Globe*, etc. that are psychology-related and causal-sounding (or ask students to bring in examples). Challenge students to design simple studies that will accurately test whether or not the relationship claimed in the headline is a valid one. Halonen reports that students enjoy the opportunity to "think like scientists" in response to humorous and outrageous claims and that this exercise helps stimulate them to scrutinize causal claims from all sources and to design experiments more carefully and creatively (and, if that isn't enough, they can practice their newfound skills in line at the grocery store)!

Halonen, J. S. (1986). *Teaching critical thinking in psychology*. Milwaukee: Alverno Productions.

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Classroom Activities, Demonstrations, and Exercises for Chapter 2
▲ Return to Chapter 2: Table of Contents

Activity 2.12 – Softens Hands While You Do Dishes

A variation of the tabloid exercise suggested above encourages students to apply experimental principles to claims they are bombarded with on a daily basis—television and magazine advertising. For this exercise, bring in (or have your students bring in) samples of advertising and have students critique the product claims of success according to principles of experimental methodology. Ads can be critiques on several grounds, including the problem of personal testimony as unreliable, the absence of a control or comparison group, the presence of extraneous variables, the presence of plausible alternative explanations, unclear or undefined variables, and a lack of supporting statistics. Jane Halonen reports that students become enthusiastic about the usually dreaded topic of experimental methodology when they realize it has the potential to make them smarter consumers.

Halonen, J. S. (1986). *Teaching critical thinking in psychology*. Milwaukee: Alverno Productions.

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Classroom Activities, Demonstrations, and Exercises for Chapter 2

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Psychology 12th edition Wade Solutions Manual

▲ Return to Chapter 2: Table of Contents

Activity 2.13 – Testing Random Assignment

Students are often distrustful of random assignment, thinking that the people with the best memory or the worst sense of smell will all end up in the same group and make the results of research undependable. This demonstration is designed to show that random assignment does produce equivalent groups.

Provide students with small cards and have them record their height in inches. If the class is small, ask them to record the height of their best friend on a second card. Collect the cards and then randomly assign them to several groups of 20. Have students calculate means for the groups.

The means should be quite close, illustrating that random assignment has produced equivalent groups. You might also explain that random assignment is not infallible and can be a source of experimental error.

This activity can be extended by using groups of different sizes, such as 2, 5, 10, 20, and 50, to show that the probability of getting groups that are not equivalent decreases as group size increases.

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Classroom Activities, Demonstrations, and Exercises for Chapter 2
▲ Return to Chapter 2: Table of Contents

Activity 2.14 – Promoting Cultural Awareness

Lani Fujitsubo suggests an exercise that can be used profitably in Introductory Psychology as well as several other courses. Ask students to play the roles of family members and one or two newspaper reporters. The family is a group of aliens from outer space who have arrived on this planet, and the reporters are interviewing them for a story of interest to their readers. Fujitsubo provides the following background information for the family member volunteers to draw from:

> *You are a family (mother, father, and child) from outer space whose spacecraft recently landed in the United States. You are doing your best to assimilate into this society and are being interviewed because your child won the local spelling bee. On your planet of origin you show respect by laughing out loud before answering a direct question. Men are not allowed to speak directly to others, and must whisper their requests to women who will then communicate directly. It is traditional to offer a gift or compliment to someone before making a request or asking for anything. If offended you use nonverbal communication to express your hurt feelings, the most common form of which is to briefly turn your back to the person. Apologies are made by briefly dipping your head. No one on your planet is considered more important than anyone else, and competition is an unknown concept. Eye contact with males is considered offensive. A question is usually never answered directly because this implies that someone is an expert and causes others to lose face.*

After the demonstration, poll the reporters and family members for their reactions. Reporters often feel frustrated, confused, misunderstood, or helpless in the face of this interaction where they don't know the "rules." Family members might also find themselves misunderstood, offended, or frustrated at the inability of the reporter to understand their situation. Class discussion of this activity can focus on the importance of appreciating differences among others and understanding where and how miscommunications might arise. More importantly, use this exercise as an opportunity to highlight the role of culture in psychological research: Findings that might seem "universal" or "correct" (based on

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data from members of exclusively one culture) might not be so.

Fujitsubo, L. C. (1999). The importance of cross-cultural sensitivity in psychology. In L. T. Benjamin, B. F. Nodine, R. M. Ernst, and C. B. Broeker (Eds.), *Activities handbook for the teaching of psychology (Vol. 4)*. Washington, DC: American Psychological Association.

► Return to Lecture Guide for Chapter 2
◄ Return to complete list of Classroom Activities, Demonstrations, and Exercises for Chapter 2
▲ Return to Chapter 2: Table of Contents

▼ HANDOUT MASTERS

2.1 – Inference or Observation?
2.2 – Operational Definitions of Handedness
2.3 – Can Science Answer This Question?
2.4 – Name That Research Method
2.5 – Making Statistics Relevant
2.6 – Understanding Correlations

▲ Return to Chapter 2: Table of Contents

Handout Master 2.1 Inference or Observation?

Decide whether each statement is objective (O) or whether it includes an inference or interpretation (I) made by the observer.

_____ 1. Marvin coughed three times before resuming his monologue on the feats he performed on the football team when he was in high school.

_____ 2. The noise from outside caught the rat's attention and it hesitated before deciding which alley to take in the maze.

_____ 3. As she began to talk about her mother's death, her grief manifested itself in tears.

_____ 4. He had his notebook open on the desk in front of him but he took no notes and during the lecture he looked at his watch 23 times.

_____ 5. After Sandra left to go to class, he continued to sit under the tree daydreaming.

_____ 6. Sammy indicated his preference for his father by approaching him whenever he wanted to be reassured.

_____ 7. When the group therapy session was over, she was so anxious to get away from the others that she forgot her purse and umbrella.

_____ 8. Sue ate her hamburger and salad rapidly, and entered the conversation at the table only once during the meal.

_____ 9. Billy became more frightened of Prissy every time she tried to hug and kiss him.

_____ 10. While Emily told the therapist about her affair with Tony, she looked at her feet and held the arms of the chair tightly.

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_____ 11. He knocked, then he rang the doorbell and waited for 87 seconds before he finally decided that there was no one home.

_____ 12. Kenny was too shy to join the other children in the sand pile, but I could tell that just watching them was a pleasant experience for him.

_____ 13. The man on the other side of the street fell after the third shot was fired by the woman standing in front of the bakery.

_____ 14. The child looked from the stick to the bread several times before she picked up the stick and used it to bring the bread within her reach.

▼ Return to complete list of Handout Masters for Chapter 2
▲ Return to Chapter 2: Table of Contents

Handout Master 2.2 Operational Definitions of Handedness

Indicate whether you use your right or left hand to complete each of the following tasks by circling the appropriate number on the five-point scale below each task.

1. To write a letter legibly.

1	2	3	4	5
always left	usually left	left = right	usually right	always right

2. To throw a ball at a target.

1	2	3	4	5
always left	usually left	left = right	usually right	always right

3. To hold scissors to cut paper.

1	2	3	4	5
always left	usually left	left = right	usually right	always right

4. To deal playing cards.

1	2	3	4	5
always left	usually left	left = right	usually right	always right

5. To hold a toothbrush while cleaning teeth.

1	2	3	4	5
always left	usually left	left = right	usually right	always right

6. To unscrew the lid of a jar.

1	2	3	4	5
always left	usually left	left = right	usually right	always right

Total your scores for these 6 items. A total of 18 points would indicate equal use of right and left hands. Scores between 19 and 30 indicate some degree of preference for use of your right hand. The closer your score is to 30, the stronger your preference for using your right hand. Scores between 6 and 17 indicate a preference for using your left hand. The closer your score is to 6, the stronger your preference for using your left hand. Using these criteria, are you more right-handed, more left-handed, or ambidextrous?

right-handed _____ left-handed _____ambidextrous _____

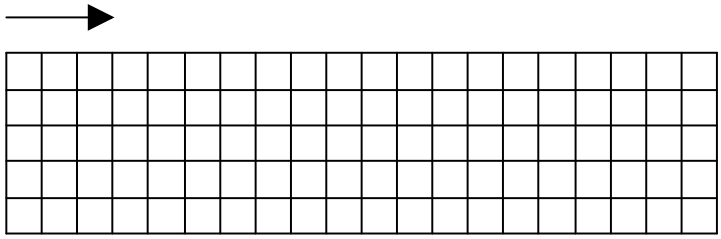
Now turn to the next page for another way of determining handedness.

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Psychology 12th edition Wade Solutions Manual

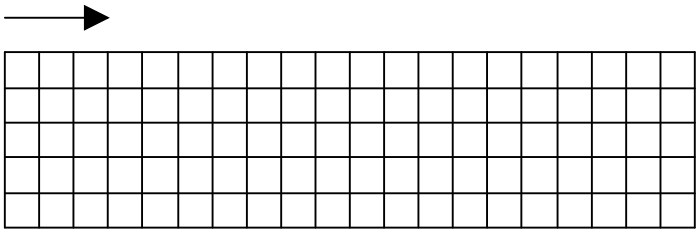
Hold a pencil in your **right** hand. Wait until your instructor tells you to begin. At the word "go," tap the middle of each box immediately below in sequence from left to right. Stop when your instructor tells you to do so. You will have 30 seconds.

Right Hand



Now hold a pencil in your **left** hand. Wait until your instructor tells you to begin. At the word "go," tap the middle of each box immediately below in sequence from left to right. Stop when your instructor tells you to do so. You will have 30 seconds.

Left Hand



Score the number of taps you made with each hand. Pencil marks must be inside the box; on the lines does not count.

Right hand _____ Left hand _____

The hand with the higher score is defined as your dominant hand. Does this measure of dominance agree with your "self-report" measures of dominance on the previous page?

▼ Return to complete list of Handout Masters for Chapter 2
▲ Return to Chapter 2: Table of Contents

Handout Master 2.3 Can Science Answer This Question?

Decide whether scientific research can answer the questions below and respond "yes" or "no" to each question. Do not try to answer the question itself. Just say whether or not scientific research can, in principle, address the question. Briefly explain why each question is, or is not, a good candidate for scientific inquiry.

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For the questions that can be studied scientifically, identify what the independent and dependent variables would be in the experiment.

1. Is abortion on demand bad for society?
2. Do people talk more after they have eaten than they do when they are hungry?
3. Does jogging lead to a positive mental attitude?
4. Are the incomes of doctors related to the grades they make in medical school?
5. Which emotion is stronger, love or anger?
6. Are breast-fed babies more alert than bottle-fed babies?
7. Will people be more moral in the year 2020 than they are now?
8. Are people who commit suicide sorry after they have done it?

▼ Return to complete list of Handout Masters for Chapter 2
▲ Return to Chapter 2: Table of Contents

Handout Master 2.4 Name That Research Method

The following are the major research methods used by psychologists. Match each with one of the following examples of research.

a. case history
b. naturalistic observation
c. laboratory observation
d. survey
e. psychological tests
f. experiment

1. Jerry is a psychology professor who is interested in the factors that affect the performance of rats who are learning to find their way through a complex maze. Every afternoon he gives each of his 50 rats ten trials in the maze, counting the number of wrong turns each rat makes on its way through the maze.
2. Ben is counseling with Ingo Larsen in a small room in the neuropsychiatric hospital. Ben is a graduate student in clinical psychology and Ingo is his client. Ingo was admitted to the neuropsychiatric hospital when he came to the student health clinic complaining that he heard voices shouting obscenities at him, and confiding that he thinks he is going through a spontaneous sex change. After each session with Ingo, Ben writes a report describing Ingo's verbal and nonverbal behavior and his interpretations of the behavior.
3. Carlos is a graduate student who plans to become a psychometrician. He, like Ben, is working at the neuropsychiatric hospital. His job is to administer a battery of tests to new patients. He will send the test results, along with his summary and interpretation of them, to the patient's clinical psychologist or psychiatrist.
4. Ada is testing the hypothesis that color preference can be influenced by associating a color with a pleasant experience, such as eating. This afternoon she is delivering a supply of red, yellow, blue, green, and white nursing bottles to the mothers of newborns who have consented to let their infants be subjects in her research.

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5. Dee is an assistant professor who will teach introductory psychology for the first time next term. She has chosen some films to show to her class of more than 200 students, and is now preparing a questionnaire to administer to her students after each film. She thinks getting student reactions to the films will be helpful next time she teaches the class.
6. Francesca is an undergraduate psychology major. For her senior thesis she is investigating the nature of the audience for pornography. This afternoon she is sitting in her car across the street from one of the pornographic bookstores in the area. She is taking notes on the sex, approximate age, and ethnicity of the patrons as they enter and leave the store.

▼ Return to complete list of Handout Masters for Chapter 2
▲ Return to Chapter 2: Table of Contents

Handout Master 2.5 Making Statistics Relevant

Student Data Sheet

Please furnish **ALL** of the information requested.

Circle one to indicate whether you are: **male** **female**

State your height in inches (e.g., a person who is 5'5" is 65 inches tall) _____ inches

State your shoe size _____

How many hours per week do you exercise *on average*? _____

Think of how "stressed out" you have felt *on average* over the past two weeks and circle the answer that best represents your stress level.

1	2	3	4	5	6	7	8	9
no stress				medium stress				extreme stress

Think of what your mood has been like *on average* over the past two weeks and circle the answer that best represents your mood.

1	2	3	4	5	6	7	8	9
very happy				neutral				very depressed

Think of what your anxiety levels have been like *on average* over the past two weeks and circle the answer that best represents your anxiety levels.

1	2	3	4	5	6	7	8	9
very calm				medium				extreme anxiety

▼ Return to complete list of Handout Masters for Chapter 2
▲ Return to Chapter 2: Table of Contents

Handout Master 2.6 Understanding Correlations

Correlational studies show relationships between variables. If high scores on one variable predict high scores on the other variable, the correlation is *positive*. If high scores on one variable predict low scores

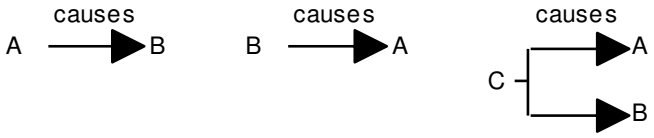
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Psychology 12th edition Wade Solutions Manual

on the other variable, the correlation is *negative*.



Showing that two variables are related does not justify claiming that a causal relationship exists. There may be a causal relationship, but other explanations usually exist. For example, the variables may be related because both have a causal relationship with a third variable.



For each of the correlational studies described below, decide whether the correlation is positive or negative and give two alternative explanations for each finding.

1. A study of married couples showed that the longer they had been married, the more similar their opinions on social and political issues were.
   Positive or negative?

   Explanation 1:

   Explanation 2:

2. An intelligence test was given to all the children in an orphanage. The results showed that the longer children had lived in the orphanage, the lower their IQ scores.
   Positive or negative?

   Explanation 1:

   Explanation 2:

3. In a study of American cities, a relationship was found between the number of violent crimes and the number of stores selling violence-depicting pornography.
   Positive or negative?

   Explanation 1:

   Explanation 2:

4. A college professor found that the more class absences students have, the lower their grade in the course tends to be.
   Positive or negative?

   Explanation 1:

   Explanation 2:

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5. A politician running against a candidate who had been in office for eight years pointed out that violent crime had increased steadily during those eight years even though the administration appropriated more and more money to fight crime.
   Positive or negative?

   Explanation 1:

   Explanation 2:

6. It was found that elementary-school children who made high scores on a vocabulary test also tended to make high scores on a test of physical strength and muscular coordination.
   Positive or negative?

   Explanation 1:

   Explanation 2:

▼ Return to complete list of Handout Masters for Chapter 2
▲ Return to Chapter 2: Table of Contents

▼ MYPSYCHLAB MULTIMEDIA RESOURCES

On-line Resources: MyPsychLab www.mypsychlab.com

What Is MyPsychLab? MyPsychLab is a learning and assessment tool that enables instructors to assess student performance and adapt course content. Students benefit from the ability to test themselves on key content, track their progress, and utilize an individually tailored study plan. In addition to the activities students can access in their customized study plans, instructors are provided with extra lecture notes, video clips, and activities that reflect the content areas their class is still struggling with. Instructors can bring these resources to class, or easily post on-line for students to access.

Instructors and students have been using MyPsychLab for over 10 years. To date, over 600,000 students have used MyPsychLab. During that time, three white papers on the efficacy of MyPsychLab were 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, 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. In addition to the eText and complete audio files, the MyPsychLab video series, MyPsychLab offers these valuable and unique tools:

MyPsychLab assessment questions: Over 3,000 questions, distinct from the test bank, but designed to help instructors easily assign additional quizzes and tests, all that can be graded automatically and loaded into an instructor's grade book.

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MyPsychLab study plan: Students have access to a **personalized study plan**, based on Bloom's Taxonomy, which arranges content from less complex thinking–like remembering and understanding–to more complex critical thinking–like applying and analyzing. This layered approach promotes better critical-thinking skills, and helps students succeed in the course and beyond.

Experiments Tool – On-line experiments help students understand scientific principles and practice through active learning – fifty new experiments, inventories, and surveys are available through MyPsychLab.

APA assessments: A unique bank of assessment items allows instructors to assess student progress against the American Psychological Association's Learning Goals and Outcomes. These assessments have been keyed to the APA's latest progressive Learning Outcomes (basic, developing, advanced).

MyPsychLab Video Resources

- The Big Picture: How to Answer Psychological Questions
- The Basics: The Scientific Method
- Special Topics: Ethics and Psychological Research
- Thinking Like a Psychologist: Critical Thinking
- In the Real World: Working Together to Resolve Conflict
- What's In It for Me? How Am I Being Influenced?

Media Links

- Complete the Survey: Participating in a Research Study
- Simulate the Experiment: Implicit Association Test: Cat vs. Dog

▼ REVEL MULTIMEDIA RESOURCES

When Your Students Are Using REVEL

Consider assigning REVEL reading to be due before students come to class. You can assign the entire chapter in just a few clicks. Throughout the chapter, quizzes and journaling opportunities help students retain the information they have read. When assigning REVEL reading, select the end-of-chapter quizzes. Then, assign the end-of-chapter quizzes to be due the day after you cover the chapter in class. To provide opportunities for students to develop better writing and critical thinking skills, in addition to end-of-chapter quizzes, consider assigning essays (autograded or instructor-graded) to be due after you cover the chapter in class. Use data from the REVEL performance dashboard to implement early intervention strategies for each student.

Fully digital and highly engaging, REVEL offers an immersive learning experience designed for the way today's students read, think, and learn. Enlivening course content with media interactives and assessments, REVEL empowers educators to increase engagement with the course, and to better connect with students: pearsonhighered.com/revel.

Section	Widget Type	Interactive REVEL Content
Introduction: How Psychologists Do Research		

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2.1: What Makes Psychological Research Scientific?	Click to Reveal	Figure 2.1 - The Cycle of Scientific Research
	Video	Thinking Critically 1
	Click to Reveal	Figure 2.2 - The Principle of Falsifiability
	Video	Thinking Critically 2
	Section Quiz	2.1: What Makes Psychological Research Scientific? (15 points)
2.2: Descriptive Studies: Establishing the Facts	Video	How to Answer Psychological Questions
	Tabs - Accordions	Case Studies
	Survey-Inventory	A Sample Personality Test
	Section Quiz	2.2: Descriptive Studies: Establishing the Facts (15 points)
2.3: Correlational Studies: Looking for Relationships	Custom	Understanding Correlations
	Section Quiz	2.3: Correlational Studies: Looking for Relationships (15 points)
2.4: Experiments: Hunting for Causes	Video	Scientific Research Methods
	Click to Reveal	Variables in the Experimental Process
	Section Quiz	2.4: Experiments: Hunting for Causes (15 points)
2.5: Evaluating the Findings	Fill-in-the-Blank	Distinguishing Descriptive and Inferential Statistics
	Table Drag-and-Drop	Reviewing Psychological Research Methods
	Section Quiz	2.5: Evaluating the Findings (15 points)
2.6: Keeping the Enterprise Ethical	Flashcards	Chapter 2 Flashcards
	Section Quiz	2.6: Keeping the Enterprise Ethical (15 points)
Taking Psychology with You: Lying with Statistics		
Summary: How Psychologists Do Research		
	Shared Writing	Lying with Statistics (20 points)
	Chapter Quiz	Chapter 2 Quiz: How Psychologists Do Research (95 points)
	Writing Space	Research Methods (100 points)
	Writing Space	Ethics (100 points)
	Writing Space	Statistics (100 points)
	Writing Space	Marriage Statistics (100 points)

► Return to Lecture Guide for Chapter 2
▲ Return to Chapter 2: Table of Contents

Answers to Chapter 2 Quiz

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1. D
2. D
3. B
4. A
5. B
6. D
7. C
8. A
9. C
10. C
11. B
12. D
13. A
14. A
15. B
16. B
17. A
18. B
19. D

▲ Return to Chapter 2: Table of Contents

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