Solution Manual for Psychological Science Modeling Scientific Literacy 2nd Edition Krause Corts 0134101588 9780134101583
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Solution Manual:

2/READING AND EVALUATING SCIENTIFIC RESEARCH

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LECTURE GUIDE

MODULE 2.1: PRINCIPLES OF SCIENTIFIC RESEARCH (Text p. 37)

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Learning Objectives

Know the key terminology related to the principles of scientific research.
See bold, italicized terms below.

Understand the five characteristics of quality scientific research.
These characteristics include:
It is based on measurements are that are objective, valid, and reliable.
It can be generalized.
It uses techniques that reduce bias.
It is made public.
It can be replicated.

Understand how biases might influence the outcome of a study.
Demand characteristics affect how participants respond in research studies. They might try to guess what the study is about or paint themselves in a favorable light. Researchers can also unintentionally introduce bias.

Apply the concepts of reliability and validity to examples.
Students should be able to read scenarios involving research methods and determine whether there are issues with reliability or validity.

Analyze whether anecdotes, authority figures, and common sense are reliably truthful sources of information.
It is important to critically evaluate the source of information. Is one person telling his/her success story? Such anecdotal evidence is usually not generalizable. Is the claim endorsed by an authority figure or expert? It's important that it's not just opinion, but also backed up by data.
Common sense is also important, but good scientific research should come first.

The most important aspect of scientific research is that it strives for objectivity.
Objectivity assumes that certain facts about the world can be observed and tested independently from the individual (e.g., a scientist) who describes them.
However, the problem is that interpretations of events are *subjective,* meaning individuals' knowledge of the event is shaped by prior beliefs, expectations, experiences, and even mood.

The Five Characteristics of Quality Scientific Research

Quality scientific research meets the following criteria:
It is based on measurements that are *objective, valid,* and *reliable*.
It can be *generalized*.
It uses techniques that reduce *bias*.
It is made *public*.
It can be *replicated*.

Scientific Measurement: Objectivity, Reliability, and Validity

The foundation of scientific methodology is the use of objective measurements.

Objective Measurements (p. 33) *are the measure of an entity or behavior that, within an allowed margin of error, is consistent across instruments and observers.*

For example, time is something that can be measure objectively regardless of the individual researcher (the observer) or the specific stopwatch they pick up (the instrument).

In psychology, we measure variables.

Variable (p. 33) *refers to the object, concept, or event being measured.*

The word variable reflects the fact that we only study things that vary; they might change over time.

Researchers have developed a wide range of *instruments*—devices and techniques for making objective measurements of variables.

Instruments related to brain imaging allow scientists to measure differences in brain structures or the amount of energy generated in specific brain regions during a variety of tasks.

Other instruments might involve computer software that can present words or images and record how long it takes for volunteers to respond to them.

Another common method used by psychologists is self-reporting.

Self-Reporting (p. 33) *is a method in which responses are provided directly by the people who are being studied, typically through face-to-face interviews, phone surveys, paper and pencil tests, and Web-based questionnaires.*

Self-report instruments may include a survey that asks respondents to rate their agreement with a set of statements using, say, a scale of 1to 7.

Other familiar instruments include tests designed to measure achievement and intelligence, for example, the SAT or ACT.

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ny method used by a researcher needs to include carefully defined terms.

researcher would want to answer questions very carefully, not only for planning and conducting a study, but also when sharing the results of that research.

Operational definitions (p. 33) *are statements that carefully describe the concepts being studied as well as the procedures and instruments being used to record observations (Figure 2.1).*

Operational definitions help ensure that researchers use measures that are as objective as possible.

The quality of an instrument or method of observation is also judged by reliability and validity.

Reliability (p. 34) *is demonstrated when a measure provides consistent and stable answers across multiple observations and points in time.*

In psychological research, several observers might watch the same individuals to record instances of aggressive behavior.

To achieve high reliability, researchers must carefully train the judges how to apply the operational definition. What specifically does someone have to do to be considered "aggressive"? What is considered not aggressive?

Reliability criteria are not only important for judges; they also apply to mechanical instruments used for measurement, such as stopwatches, brain imaging equipment, and questionnaires. All of these instruments need to be consistent in their recordings.

Closely related to reliability is the concept of validity.

Validity (p. 34) *is the degree to which an instrument or procedure actually measures what it claims to measure.*

What if a psychologist claimed to measure intelligence based on shoe size?

He could give a clear operational definition of how to measure shoe size.

His measure could be reliable--a simple tape measure should give the same answer (or close to it) each time a specific foot is measured.

c) But no matter how consistently a tape measure yields a size it is not a valid measure of intelligence.

Valid measures might include problem solving and logical thinking--abilities that actually constitute the definition of intelligence.

Generalizability of Results

When we apply information and findings from one person to another, we are *generalizing*.

Generalizability (p. 35) *refers to the degree to which one set of results can be applied to other situations, individuals, or events.*

One way to increase the possibility that research results will generalize is to study a large group of subjects.

By examining and reporting an average effect for that group, psychologists can get a much better sense of how individuals are likely to behave.

Ideally, it would be best to study an entire population.

In reality, the task of finding all population members, persuading them to participate, and measuring their behavior is impossible in most cases. Instead, psychologists typically study a sample.

Population (p. 35) *is the group that research want to generalize about.*

Sample (p. 35) *is a select group of population members.*

To ensure that findings within a sample generalize to a larger population, psychologists prefer to use random sampling whenever possible.

Random sample (p. 35) *means that every individual of a population has an equal chance of being included.*

If you wanted to study the population of students at your school, for example, the best way to obtain a true random sample would be to have a computer generate a list of names from the entire student body.

Your random sample—a subset of this population—would then be identified, with each member of the population having an equal chance of being selected regardless of class standing, gender, major, living situation, and other factors

Obtaining a true random sample can be extremely difficult to do. In practice, psychologists are more likely to settle for convenience samples

Convenience Samples (p. 35) *are samples of individuals who are the most readily available.*

The location of the study can also affect the generalizability of the findings.

There are two primary research locations.

Laboratory research includes any study conducted in an environment controlled by the researcher.

Naturalistic research takes place where the behavior would typically occur.

Many psychologists prefer to conduct their research in the controlled setting of the laboratory so that they can see how specific conditions influence behavior. However, the artificial nature of the laboratory can sometimes interfere with normal behavior, which in turn would affect the generalizability of the findings.

Ecological validity (p. 35) *is the degree to which the results of a study can be applied to or repeated in the natural environment.*

Sources of Bias in Psychological Research

Various types of bias can be introduced by the researchers doing the measuring as well as by the people or animals being observed.

Hawthorne Effect (p. 35) *is a term used to describe situations in which behavior changes as a result of being observed.*

In the 1920s researchers in the Chicago area studied the relationship between productivity and working conditions at the Western Electric Company's Hawthorne Works.

When the researchers introduced some minor change in working conditions, such as adjustments in the lighting, the workers were more productive for a period of time.

When they changed another variable in a different study—such as having fewer but longer breaks—productivity increased again.

What was not obvious to the researchers was that any change in factory conditions brought about increased productivity, presumably because the changes were always followed by close attention from the factory supervisors.

Working the Scientific Literacy Model: Demand Characteristics and Participant Behavior

What do we know about how bias affects research participants?

People who participate in psychological studies typically enter the research environment with a curiosity about the subject of the study. Researchers need to withhold as much detail as possible to get the best, least biased results possible. ***Demand characteristics (p. 36)*** *are inadvertent cues given off by the experimenter or the experimental context that provide information about how participants are expected to behave.*

For example, imagine you walk into a laboratory and a psychologist asks you to put on a heavy backpack. She then shows you a ramp and asks you to estimate how steep the ramp is. You would probably assume that these two events were related, and so the experimenter must want to know whether a heavy backpack will affect your judgment of the ramp.

Social desirability/Socially desirable responding (p. 41) *means that research participants try to present themselves in the most favorable way. This may be the most charitable or least prejudiced, for example.*

This type of bias is particularly relevant when the study involves face-to-face contact between the researcher and the volunteers.

How can science test the effects of demand characteristics on behavior?

Using the same scenario with the backpack, psychologists have tested exactly how demand characteristics affect people's judgment.

Undergraduate students were assigned to one of three groups.

Group 1 did not wear a backpack during a task;

Group 2 wore a 25-pound backpack with no explanation as to why

Group 3 wore a 25-pound backpack and was told that its contents consisted of electrical recording equipment that would measure the muscle activity of their ankles. To increase the believability of this procedure, actual electrodes with wires running to the backpack were attached to the ankles of members of the third group.

One at a time, each participant was taken to the room that contained a ramp and was asked to judge how steep the ramp was before and after stepping on it.
After completing the procedure, the participants responded to a survey that included a question about what they believed to be the purpose of the study.
Volunteers in Group 2—those who wore the backpack without any explanation as to why— judged the ramp to be steeper than did members of the other two groups
On the survey, these same students reported that the purpose of the experiment was probably to determine how wearing a backpack affects steepness judgments. Students in Group 1 (who did not wear the backpack) and most importantly, those in Group 3 (who thought the backpack had a specific purpose) did not report this belief. Clearly, demand characteristics affected both the participants' perceptual judgment of slope as well as their beliefs about the purpose of the experiment

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ow can we critically evaluate the issue of bias in research?

Researchers are another source of bias in research.
Some classic examples of how expectations can influence results come from the research of Rosenthal and colleagues. In one study they told teachers in 18 different classrooms that a group of children had "unusual" potential for learning when in reality they were just a random selection of students.
After 8 months, the children singled out as especially promising showed significant gains in grades and intelligence test scores (which are believed to be relatively stable).
Experimenter bias can even be found when people work with animals.
When research assistants were told they were handling "bright" rats, it appeared the animals learned faster than when handling "dull" rats.
Because it is unlikely that these laboratory animals were influenced by demand characteristics—the rats were not trying to figure out what the researchers wanted—the most likely explanation for this difference is that researchers made subtle changes in how they observed and recorded behavior.

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hy is this relevant?

Given the time, energy, and monetary cost of conducting research, it is critical that results are as free from contamination as possible.
Because of this, scientists that test new drugs or other treatments regularly give one group of volunteers an inactive substance (the placebo) so that they can be compared to a group given the active drug.

Placebo effect (p. 37) *is a measurable and experienced improvement in health or behavior that cannot be attributable to a medication or treatment.*

Techniques that Reduce Bias

One of the best techniques for reducing subject bias—especially social desirability—is to provide anonymity and confidentiality to the volunteers.
Anonymity means that each individual's responses are recorded without any name or other personal information that could link a particular individual to specific results.
Confidentiality means that only the researcher will see the results.

Participant anxiety about the experiment can be reduced when researchers provide full information about how they will eventually use the data.

If volunteers know that the data will not be used to diagnose psychiatric problems, affect their grades, or harm them in some other way, then their concerns about the study will be less likely to affect their performance.

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esearchers can reduce biased responding from participants by using what are called blind procedures (Figure 2.3).

Single-blind study (p. 37) *is a study in which the participants do not know the true purpose of the study, or else do not know which type of treatment they are receiving (for example, a placebo or a drug).*

A researcher can introduce bias as well, so an even more effective technique is a double-blind study.

Double-blind study (p. 37) *is a study in which neither the participant nor the experimenter knows the exact treatment for any individual.*

To carry out a double-blind procedure, the researcher must arrange for an assistant to conduct the observations, or at the very least, the research must not be told which type of treatment a person is receiving until after the study is completed.

Double-blind procedures are the best techniques for removing researcher and participant bias.
If a researcher stood to make money, he or she could introduce bias into the study; even the most honest researchers could be unintentionally lenient when setting up or evaluating their observations.
From the volunteer's perspective, just knowing the scientists' beliefs might be enough to introduce participant bias.

<u>Sharing the Results</u>

One of the most important aspects of scientific research is making the results public.
Sharing results is what allows researchers this process to occur among groups of researchers working in different laboratories. .
A very important aspect of science is having the opportunity to repeat someone else's study to confirm or reject that researcher's observations and findings.

Psychology's primary mode of communication is through academic journals.
Journals resemble magazines in that they are periodicals with a number of articles by different authors. Unlike magazines, however, journal articles are written by scientists to describe and explain their research or to review multiple studies on a single topic.
You will not find journals or research books in your average mall bookstore because they are too specialized for the general market, but you will find hundreds of them if you check with your school's librarians.
Before research findings can be published, they go through peer review.

Peer review (p. 38) *is a process in which papers submitted for publication in scholarly journals are read and critiqued by experts in the specific field of study.*

First, an editor receives the manuscript from the researcher and determines whether it is appropriate subject matter for the journal.
If so, then the editor sends copies of the manuscript to a select group of peer reviewers.

Peer in this case refers to another professional working within the same field of study. These reviewers critique the methods and results of the research and make recommendations to the editor regarding the merits of the research.

The editors and reviewers serve as gatekeepers for the discipline, which helps increase the likelihood that the highest quality research is made public.

Science is an objective, ongoing, and self-correcting process. The finest, most interesting published research study can quickly become obsolete if other scientists cannot reproduce it.

Replication (p. 39) *is the process of repeating a study and finding a similar outcome each time.*

As long as an experiment uses sufficiently objective measurements and techniques, and if the original hypothesis was correct, then similar results should be achieved by later researchers who perform the same types of studies. Results are not always replicated in subsequent investigations, however.

peer review and replication are self-corrective measures for all disciplines, because they ensure that published results did not occur through carelessness, dishonesty, or coincidence.

Subjective Thinking: Anecdotes, Authority, and Common Sense

Poor evidence comes most often in one of three varieties: anecdotes, appeals to authority, and common sense.

In an advertisement for a weight loss pill you might see a statement that an individual lost 200 pounds. That information is just anecdotal evidence.

Anecdotal evidence (p. 39) *is an individual's story or testimony about an observation or event that is used to make a claim as evidence.*

There is no way of knowing whether the diet was responsible for the person's weight loss The outcome could have been due to any number of things, such as changes in food intake and lifestyle that were not a part of the diet plan.

The second kind of bogus evidence is the appeal to authority.

Appeal to authority (p. 39) *is the belief in an expert's claim even when no supporting data or scientific evidence is present.*

Expertise is not actually evidence; the term "expert" describes the person making the claim, not the claim itself.

It is entirely possible that the expert is mistaken, dishonest, overpaid, or misquoted.

True experts are good at developing evidence, so if a claim cites someone's expertise as evidence, then you should be perfectly comfortable asking whether the expert has peer-reviewed data to support the claim.

True experts also understand that you have every right to be skeptical, so there is no harm in considering what the expert stands to gain by arguing for certain ideas and beliefs.

Finally, the purported evidence may consist of an appeal to common sense.

Appeal to common sense (p. 39) *a claim that appears to be sound but lacks supporting scientific evidence.*

For example, throughout history, many people assumed the world was the stationary center of the universe (Figure 2.4).

The idea that the Earth could orbit the sun at blinding speeds was deemed nonsense. The force generated would seemingly cause all the people and objects to be flung into space!

Beliefs can originate from other potentially unreliable sources.

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ppeals to tradition:" We have always done it this way!"

Appeals to novelty: "It is the latest thing!"

ANSWERS TO MODULE 2.1 QUIZ

2.1.1 A
2.1.2 B
2.1.3 C
2.1.4 A
2.1.5 C

MODULE 2.2: SCIENTIFIC RESEARCH DESIGNS (Text p. 42)

▲ Ret urn t o Tabl e of Conte nts

Learning Objectives

Know the key terminology related to research designs.

See bold, italicized terms below.

Understand what it means when variables are positively or negatively correlated.

When two variables are positively correlated, they happen together (increase or decrease). For example, income and education are positively correlated. When two variables are negatively correlated, as one increases, the other decreases. For example, more sleep is associated with less irritability.

Understand how experiments help demonstrate cause-and-effect relationships.

Experiments rely on random assignment and the manipulation of an independent variable to show cause and effect. Two or more groups are randomly assigned to a group to ensure the groups are roughly equal. Then researchers manipulate an independent variable and measure the dependent variable. If one group turns out to be different, that difference is most likely due to the independent variable.

Apply the terms and concepts of experimental methods to research examples.

Students should be able to read research scenarios and identify which experimental methods are being used.

Analyze the pros and cons of descriptive, correlational, and experimental research designs.

Descriptive methods allow researchers to observe and give rich details about naturally occurring behaviors. Correlational designs build on this design by showing how those observed variables relate. However, correlation does not equal causation. Experiments are needed to determine cause-and-effect relations. However, experiments done in laboratories make lack generalizability to real-world situations.

Psychologists always begin their research with a *research question*.
For example, "How does attitude affect health?"
They also make a hypothesis, or prediction, about the outcome.

To test the hypotheses, psychologists use a variety of methods called *research designs* to help guide investigators in:
Organizing the study
Making observations
Evaluating the results

Because there are so many designs available, psychologists must choose the design that best fits the research question and is best suited to the subject of the research. However, all research designs have certain common characteristics.
All designs include variables (from module 2.1).
Sense of humor is a variable. People have varying levels of it.
Operational definitions are needed to describe the variables and methods used.
Humor might be measured using the Coping Humor Scale.
All designs result in collected data. These are the observations about the variables of interest.
Data might consist of the scores on the Coping Humor Scale from each individual in the sample.

Table 2.2 lists the strengths and limitations of different research designs.

Descriptive Research

The beginning of any new line of research must involve descriptive data.
This type of data is only from observations.
There is no attempt to explain why a behavior happened.
For example, researchers might observe a two-year-old and count how many words are spoken or see how many hours per week a typical college student spends on homework.

To gather this type of data, psychologists use case studies, naturalistic observation, or surveys and questionnaires.

Case Studies

Case studies are useful when a researcher was very specific details about an individual, such as symptoms of psychological disorders and detailed descriptions of successes or failures in treatment.

Case Study (p. 43) *is an in-depth report about the details of a specific case.*

This design allows researchers to gain an extensive amount of details regarding the effects of a treatment on an individual.
For example, one study followed an individual for 16 weeks to examine a specific type of anxiety disorder.
Researchers documented how and when changes happened, and the effects of the treatment on the individual and the individual's life.

The main disadvantage of this design is that there is no guarantee the findings can be generalized to other individuals and situations.

Naturalistic Observation

Another approach is to observe people and animals in their natural settings.

Naturalistic Observation (p. 43) *occurs when psychologists unobtrusively observe and record behavior as it occurs in the subject's natural environment.*

Naturalistic observation can happen anywhere that behavior occurs.
For example, researchers might observe chimpanzees in forests or even human behaviors after drinking at a bar.
The key is that the researchers are making systematic observations of specific variables according to operational definitions.
This is in contrast to those of us who like to people watch.

However, when researchers want more specific types of data, sometimes they need to develop specific questions for participants to answer.

Surveys and Questionnaires

Surveys and questionnaires are still a method of observation, except now the participant is making the observation regarding his/her beliefs, attitudes, opinions, etc.

These can come in the form of face-to-face interviews, phone surveys, paper-and-pencil tests, and web-based questionnaires.

Correlational Research

Psychologists almost always observe more than one behavior or variable in descriptive research and they often want to know how these variables relate.

Correlational Research (p. 44) *involves measuring the degree of association between two or more variables.*

Correlational research may involve any of the descriptive methods discussed earlier, but now the data are evaluated in such a way to see if there are relationships between the variables.
For example, do countries with higher graduation rates also tend to have higher income levels?
How the variables relate or correlate can be visualized by using scatterplots (figure 2.5).

Correlations have two main characteristics.
They have a direction (figure 2.5).
They can be positive, meaning they both variables occur together (e.g., as one increases, so does the other).
They can be negative, meaning that more of one variable, the less of the other (e.g., more sleep, less irritability).
Correlations also have *magnitude* or *strength*.

This magnitude (like direction) is described in terms of a measure called the *correlation coefficient*.
The correlation coefficient ranges from -1.0 to +1.0, but the closer to the absolute of 1.0, the stronger the relation.
In a scatter plot, the dots are very close together when there is a strong correlation and all over the place when there is a weak correlation.

It is important to keep in mind that correlations only show how variables are related. A correlation does not equal causation!
For example, a sense of good humor is related to positive health.
Does humor cause one to have good health?
Does good health lead of a good humor?
Or maybe a third variable causes both good humor and health.
For example, ice cream sales and homicide rates are positively correlated.
Does ice cream consumption drive people to murder?
Does murder lead to ice cream cravings?
Most likely, a third variable, such as hot summers, explains both.
We cannot establish cause with correlations because of the *third variable problem*, which refers to the possibility that a third, unmeasured variable is actually responsible for a well-established correlation between the two variables.

Myths in Mind: Beware of Illusory Correlations

Many common beliefs ingrained in our culture consist of perceived correlations that actually do not exist.
For example, crime increases when there is a full moon, opposites attract, and that gamblers can get on a “hot streak.”
These are *illusory correlations*, which are relationships that really exist only in the mind, rather than in reality.
Sound research studies have failed to show that full moons are related to bizarre or violent behavior.
People who are attracted to each other are usually very similar.
And there is no such thing as a hot streak in competitive sports or gambling.
Stereotypes are often based on illusory correlations.

However, these perceptions of correlations exist because they easily come to mind.
Normal events don’t stand out as much, so we are less likely to take note of them, and in turn are slower to recall them vs. events or pairings that are not normal.

Experimental Research

Experimental designs are the only designs that can provide strong evidence for cause-and-effect relationships.

Like correlational research, experiments have at least two variables. However, there are two main differences between the two designs.
The random assignment of participants.
The experimenter’s control over the variables being studied.

The Experimental Method

The first unique element of experiments is random assignment.

Random assignment (p. 45) *is a technique for dividing samples into two or more groups.*

Similar to random samples, this gives each participant an equal chance of being place into any one of the experimental groups.

This helps to ensure that the groups are roughly equal.

Allowing the participants to pick the group might lead to unequal groups.

After all, there are individual reasons why we might choose to group ourselves with others.

Figure 2.6 shows an example of how random assignment works in an experiment examining the effects of humorous material on stress.

When groups are not randomly assigned, all sorts of confounding variables could enter the picture.

Confounding variables (p. 46) *are variables outside of the researcher's control that might affect the results.*

Confounding variables differ depending on the variables and design of the study. However, researchers typically cannot control the moods participants are in or an individual's personality.

There are also specific types of variables used in experiments: dependent and independent variables.

Dependent Variable (p. 46) *is the observation or measurement that is recorded during the experiment and subsequently compared across all groups.*

Independent Variable (p. 46) *is the variable that the experimenter manipulates to distinguish between the two groups.*

In regards to our experiment on how humorous material effects stress, exposure to humorous material or non-humorous material would be the IV and one's stress score would be the DV.

The experimental group would view the humorous material and the control group would view the non-humorous material.

Experimental group (p. 46) *is the group in the experiment that is exposed to the independent variable.*

Control group (p. 46) *is the group that does not receive the treatment and, therefore, serves as a comparison.*

If the experimental group showed a reduction is stress, we could conclude that exposure to humorous materials is responsible for the difference (as long as it was a well-designed experiment and confounds were accounted for).

The Quasi-Experimental Method

Random assignment and manipulation of a variable are needed to determine cause and effect relationships. However, in some cases, random assignment is not possible.

Quasi-experimental research (p. 47) *is a research technique in which the two or more groups that are compared are selected based on predetermined characteristics, rather than random assignment.*

For example, many studies compare men and women.

We can't randomly assign people to one group or the other.

Men and women are also bound to differ in terms of genetics, gender roles, family history, and so on.

Because of this, quasi-experiments can point out relationships, but cannot determine what causes the differences between groups (like correlations).

ANSWERS TO MODULE 2.2 QUIZ

2.2.1 B
2.2.2 A
2.2.3 C
2.2.4 B
2.2.5 A

MODULE 2.3: ETHICS IN PSYCHOLOGICAL RESEARCH (Text p. 49)

▲ Ret urn t o Tabl e of Conte nts

Learning Objectives

Know the key terminology of research ethics.

See bold, italicized terms below.

Understand the importance of reporting and storing data.

Making data public allows scientific peers, as well as the general public, to have access to the details of the research studies. This information includes details about participants, the procedures they experienced, and the outcome of the study.

Furthermore, the requirement that data be stored allows fellow researchers to verify reports as well as examine the study for any possible misconduct. Fortunately, such cases are rare.

Understand the ethical guidelines that apply to research with humans or other species.

Humans must be able to give fully informed consent, meaning that they understand the risks and benefits of participating and are freely volunteering. Note that some people (such as young children) may not fully understand, while others (such as prisoners) may not feel like they have a choice. Further efforts should be used to protect their safety and privacy.

There are times when scientists need to control genetic and environmental variables that cannot be ethically controlled in samples of humans. In these cases, researchers may use animals as long as they can demonstrate the importance of the experiment and reduce the animals' discomfort to the greatest extent possible.

Apply the ethical principles of scientific research to examples.

If you are ever asked to participate in psychological research, you should receive informed consent information before you begin. If the researcher fails to do so, you should ask for it, and then apply your knowledge of research ethics to make sure you can give fully informed consent.

The "informed" part of informed consent means that individuals are fully informed about risks they may experience as a result of participating in the study. Participants generally have the right to quit at any time, or to decline to answer any specific questions they choose.

Analyze the role of using deception is psychological research.

It is often the case that fully disclosing the purpose of a study before people participate in it would render the results useless. Thus, specific details of the study may not be provided during informed consent (although all potential risks are disclosed). When deception of any kind is used, researchers must justify that the benefits of doing so outweigh the costs.

Promoting the Welfare of Research Participants

Because psychologists study living, sensing organisms, a number of ethical issues must be addressed before any study beings.

For example, the physical and mental well-being of volunteers must be protected.
Their responses must remain anonymous.
They have to give consent before being in a study.

Unfortunately, such standards have been put in place as a result of some very unethical studies.

One frequently cited example is the Tuskegee Syphilis Study.

In 1932, 399 African American men from Tuskegee, Alabama, were recruited to participate in a medical study sponsored by the United States Public Health Service (USPHS). At the time, the USPHS was interested in observing the long-term effects of syphilis, a disease involving chronic degeneration of the nervous system, dementia, and, if left untreated, death.

The recruiting physicians promised them free treatment medical care, transportation to the clinics, and a square meal for their participation.
When these men volunteered, they were showing early symptoms of syphilis, but were told they were suffering from "bad blood."

Less than 10 years into this study, researchers elsewhere discovered that penicillin could treat the disease effectively. By 1947, the drug became well established as a cure and widely available. Yet, the USPHS elected not to treat any of their volunteers.
By the time this study ended in 1974, 28 of the men had died from the disease, and 100 others suffered from problems related to it.

Such unethical treatment of research participants have led scientific groups around the world to develop codes of conduct to protect the human and animal subjects in research.

In the US, all institutions that engage in research with humans are required to have an IRB.

Institutional Review Board (IRB) (p. 50) *is a committee of researchers and officials at an institution charged with the protection of human research participants.*

The IRB is intended to protect individuals in two main ways:

The committee weighs the potential risks to the volunteers against the benefits of the research.
It requires that volunteers agree to participate in the research.

Weighing the Risks and Benefits of Research

The majority of psychological research involves little risk of physical or emotional consequences. However, some research involves exposing individuals to brief periods of mild stress,

Some studies cause stress by placing a hand in a tub of freezing water or engaging participants in brief periods of exercise.

Other studies present physical risks, for example, exposing participants to the virus that causes the common cold or making small cuts in their skin to study factors that affect healing.

More consideration needs to go into exposing participants to potential social risks, however, as humans are social beings with friends and families with social networks to maintain and reputations to uphold.

Information about one's history of substance abuse, criminal records, medical records, and even information as seemingly benign as opinions about teachers or supervisors, needs to be treated with sensitivity.

When participants are asked questions about such topics, researchers emphasize anonymity and confidentiality.

Research can present psychological risks, and so researchers need to justify how any negative emotional consequences of participating in a study are reasonable in light of what can be learned.

Everyone involved in the research process—the researcher, the IRB, and the potential volunteer—must determine whether the study's inherent risks are worth what can potentially be learned if the research goes forward.

The psychologists who undertake such research tend to be motivated by several factors—including the desire to help others, the drive to satisfy their intellectual curiosity, and even their own livelihood and employment.

Potential volunteers can be swayed by incentives, such as money. Others may fail to understand what their participation entails.

In these cases, the IRB serves as a third party that weighs the risks and benefits of research without being personally invested in the outcome.

Obtaining Informed Consent

In addition to weighing the risks versus the benefits of a study, researchers must ensure that human volunteers truly are *volunteers*.

Recall that the human subjects at Tuskegee were volunteers only in the sense that they voluntarily sought treatment for their "bad blood." Had the men known the true nature of the study, it is doubtful that any would have continued to participate.

Current practice is based on the concept of informed consent.

Informed Consent (p. 50)*: a potential volunteer must be informed (know the purpose, tasks, and risks involved in the study) and give consent (agree to participate on the information provided) without pressure.*

To be truly informed about the study, participants must be told at least the following details (see also Figure 2.7):

The topic of the study.
The nature of any stimuli (e.g., images, sounds, smells) to which they will be exposed.
The nature of any tasks (e.g., test, puzzles) they will complete.
The approximate duration of the study.
Any potential physical, psychological, or social risks involved.
The steps that the researchers have taken to minimize those risks.

Ethical guidelines often help to negotiate conflicting interests between the need for informed consent and the need for "blinded" volunteers.

Recall from Module 2.1 that in the best experimental designs the participants do not know exactly what the study is about, because such information may lead to subject bias.

In these cases, researchers use deception.

Deception (p. 51) *is misleading or only partially informing participants of the true topic or hypothesis under investigation.*

In these cases, participants are given enough information to evaluate their own risks.

In medical research situations, deception can be much more serious.

Patients who are being tested with an experimental drug may be randomly chosen to receive a placebo.

In addition, participants must give full consent, which means:

They have the freedom to choose to not participant and not have to worry about any loss, harm, or damage.

Participants must be given equal opportunities.

For example, Introductory Psychology students participating for credit must be offered alternative credit opportunities if they choose not to participate in the study.

Volunteers have the right to withdraw from a study at any time without penalty.

Participants also have the right to withhold responses.

For example, they do not have to answer survey questions that make them uncomfortable.

Researcher who wish to study those who cannot give full consent (e.g., children, those with certain mental or neurological disorders), must obtain consent from a parent or next-of-kin.

After participating in the research study, participants must undergo a full debriefing.

Once participants are informed, they must also be able to give consent. Modern psychological research includes the following elements in determining whether full consent is given:

Freedom to choose. Individuals should not be at risk for financial loss, physical harm, or damage to their reputation if they choose not to participate.

Equal opportunities. Volunteers should have choices. For example, if the volunteers are introductory psychology students seeking course credit, they must have non-research alternatives available to them for credit should they choose not to participate in a study.

The right to withdraw. Volunteers should have the right to withdraw from the study, at any time, without penalty. The right to give informed consent stays with the participants throughout the entire study.

The right to withhold responses. Volunteers responding to surveys or interviews should not have to answer any question that they feel uncomfortable answering.

If researchers are studying children or individuals with mental disabilities, some severe psychiatric disorders, or certain neurological conditions, then a third party must give consent on behalf of the participant.

This usually amounts to a parent or next-of-kin.

All the rules of informed consent still apply.

The Welfare of Animals in Research

Many people who have never taken a psychology course view psychology as the study of human behavior, but research with animals is just as important to psychological science for many reasons.

- Scientists can administer treatments to animals that could never be applied to humans.
- Genetic research requires species with much shorter lifespans than our own so that several successive generations can be observed.
- Scientists can manipulate the breeding of laboratory animals to meet the needs of their experimental procedures.
  - Selective breeding allows researchers to study highly similar groups of subjects, which helps control for individual differences based on genetic factors.

Many ethical standards for animal research were developed the same time as those for human research.

- Colleges and universities have established committees responsible for the ethical treatment of animals, which are in some ways similar to IRBs that monitor human research.

Researchers and animal welfare committees emphasize three main areas of ethical treatment.

- Providing appropriate housing, feeding, and sanitation for the species.
- Minimization of any pain or discomfort experienced by the animals.
- When it is necessary, ensuring that the pain can be justified by the potential benefits of the research.

Ethical Collection, Storage, and Reporting of Data

Researchers have continuing commitments to the participants to maintain the anonymity, confidentiality, and security of the data.

Once data are reported in a journal or at a conference, they should be kept for a reasonable amount of time—generally three to five years.

- Keeping the data relates to the public nature of good research.
  - Other researchers may request access to the data to reinterpret it, or perhaps examine the data before attempting to replicate findings.

Scientists must be honest with their data.

- Sometimes researchers experience great external pressure to obtain certain results.
  - These pressures may relate to receiving tenure at a university; gaining funding from a governmental, industrial, or nonprofit agency; or providing evidence that a product (for example, a medical treatment for depression) is effective.
- Cases of *scientific misconduct* sometimes arise when individuals fabricate or manipulate their data to fit their desired results.
- It is also possible to minimize the pressures by requiring researchers to acknowledge any potential conflicts of interest, which might include personal financial gain from an institution or company that funded the work.
  - If you look at most published journal articles, you will see a footnote indicating which agency or organization provided the funds for the study. This annotation is not just a goodwill gesture; it also informs the public when there is the potential for a company or government agency to influence research.

▼ANSWERS TO MODULE 2.3 QUIZ

2.3.1 B
2.3.2 C
2.3.3 A
2.3.4 B
2.3.5 B

IV. MODULE 2.4: A STATISTICAL PRIMER (Text p. 56)

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Learning Objectives

Know the key terminology of statistics.

See bold, italicized terms below.

Understand how and why psychologists use significance tests.

Significance tests are statistics that tell us whether differences between groups or distributions are meaningful. For example, the averages of two groups being compared may be very different. However, how much variability there is among individuals within each of the groups will determine whether the averages are significantly different. In some cases, the averages of the two groups may be different, yet not statistically different because the groups overlap so much. This possibility explains why psychologists use significance tests—to test whether groups really are different from one another.

Apply your knowledge to read and create the most frequently used types of graphs.

Scientific literacy goes beyond just reading words, it also involves looking at images. Graphs are often used to summarize important data in a format that is relatively easy to read as long as you know what to look for. Analyze the choice of central tendency statistics based on the shape of the distribution. It is important to consider they type of data and the shape of the distribution. For example, the mean and median usually give us more information about the central tendency. The mode is usually used for categorical data. For example, a mode can represent a candidate with the most votes.

Analyze the conclusions that psychologists can reach based on significance tests.

If a significance test reveals that two or more groups are significantly different, it means that chance alone is a very unlikely explanation for why they differ. If the significance test indicates that the groups are not significantly different, then we can conclude that the individuals tested do not differ according to the independent variable for which they were tested.

The analysis of scientific data typically begins with organizing numbers into ways that can be summarized and visualized; this provides an overall picture of trends and outcomes of the research.

Researchers analyze the data with statistical procedures to determine whether the outcomes confirm or refute a hypothesis.

Descriptive Statistics

Once research data have been collected, psychologists use descriptive statistics.

Descriptive Statistics (p. 56) *are a set of techniques used to organize, summarize, and interpret data.*

In most research, the statistics used to describe and understand the data are of three types: frequency, central tendency, and variability.

Frequency

Often, the first step in understanding data is to prepare a graph.

This depiction of data allows researchers to see the *distribution*, or the location of where scores cluster on a number line and to what degree they are spread out.

Researchers often present data in a type of bar graph called a *histogram*.

Like other bar graphs, the vertical axis shows the frequency.

Frequency (p. 564) *is the number of observations that fall within a certain category or range of scores.*

These graphs are generally very easy to interpret; the higher the bar, the more scores that fall into the specific range (Figure 2.8).

The horizontal axis basically describes the heights of the bars.

It is usually easy to describe the distribution of scores from a histogram. By examining changes in frequency across the horizontal axis—basically by describing the heights of the bars—we can learn something about the variable.

By examining changes in frequency across the horizontal axis—basically by describing the heights of the bars—we can learn something about the variable. Where would you say the most scores cluster together? And how would you describe the way they spread out?

Although there are specific mathematical ways of answering these questions, we are still safe in making an estimate based on the graph

We can describe this spread as a symmetrical curve, meaning that the left half is the mirror image of the right half.

Normal Distribution (p. 56) *(also called a bell curve) is a symmetrical distribution with values clustered around a central, mean value.*

Many variables wind up in a normal distribution, such as, the scores on most standardized tests or the average amount of sleep adult humans get each night.

Other variables have what is known as a skewed distribution, like the ones shown in Figure 2.9.

Negatively Skewed Distribution (p. 57) *occurs when the curve has an extended tail to the left of the cluster.*

Positively Skewed Distribution (p. 57) *occurs when the long tail is on the right of the cluster.*

Most of the time, skews occur because there is an upper or lower limit to the data.

For example, a person cannot take less than 0 minutes to complete a quiz so a curve depicting times to complete a quiz cannot continue indefinitely to the left, beyond the zero point.

In contrast, just one person could take a very long time to complete a quiz, causing the right side of the curve to extend far to the right.

Central Tendency

When we identified the portion of the graph where the scores seem to cluster together, we were estimating central tendency.

Central Tendency (p. 57) *is a measure of the central point of a distribution.*

Psychologists choose to calculate central tendency by using one of three measures: mean, median, and mode (Figure 2.10).

Mean (p. 57) *is the arithmetic average of a set of numbers.*

Median (p. 57) *is the 50th percentile—the point on the horizontal axis at which 50% of the observations are lower and 50% of all observations are higher.*

Mode (p. 57) *is the category with the highest frequency.*

However, the mean and median usually give us more information about the central tendency.

Central tendency (p. 57) is where the scores cluster

The mode is typically used only when dealing with categories of data.
For example, when you vote for a candidate, the mode represents the candidate with the most votes, and (in most cases) that person wins.

Notice that in Figure 2.11 the mean, median, and mode are the same.
This is not always the case, but it is true for perfectly symmetrical curves.

If the histogram spreads out in one direction—in Figure 2.11, it is positively skewed—we are usually better off calculating central tendency by using the median.
Notice what happens when you start to add extremely wealthy households to the data set: The tail extends to the right and the mean is pulled in that direction. The longer the tail, the more the mean is pulled away from the center of the curve.
The median stays relatively stable.

Variability

Measures of central tendency help us summarize a group of individual cases with a single number by identifying a cluster of scores. In some distributions, however, the scores are more spread out than clustered (see Figure 2.13).

Variability (p. 58) *is the degree to which scores are dispersed in a distribution.*

When variability is low, the measures of central tendency tend to be the same, so they are a good representation of the distribution. But when variability is high, some data are much farther from the center. Therefore, whenever psychologists report data from their research, their measures of central tendency are virtually always accompanied by measures of variability.

Standard deviation (p. 58) *is a measure of variability around the mea*n.

Think of it as an estimate of the average distance from the mean.

For example, consider the Graduate Record Examination (GRE), which is a standardized test for admission into many graduate programs.

If someone reports that the mean GRE verbal reasoning test score is 150 with a standard deviation of 8, you should infer that 150 is in the middle of the pack and most people are within about 8 points on either side of the mean.

Hypothesis Testing: Evaluating the Outcome of the Study

After researchers have described their data, the next step is to test whether the data support their hypothesis.

Imagine, for example, that we wanted to test whether text messaging reduces feelings of loneliness in first-year college students.

For three days, randomly selected students who regularly send text messages are assigned to one of two groups:

Those who can text

Those who cannot

After 3 days, the students fill out a survey measuring how lonely they have felt.

The independent variable consists of the two groups, which includes texting or no texting. The dependent variable is the outcome—in this case, loneliness, with larger scores indicating greater loneliness.

The mean loneliness score of the group who could text message is three points below the mean of the group who did not text message.

Are you willing to say that texting causes people to feel less lonely?

What we do not know is the variability in the scores.

On the one hand, it is quite possible that the scores of the two groups look like graph (a), which appears in the interactive. In that situation, the means are three points apart and the standard deviation is very small, so the curves have very little overlap. On the other hand, the scores of each group could have a broad range and therefore look like graph (b).In that case, the group means are three points apart, but the groups overlap so much—the standard deviations are very high—that they seem virtually identical.

How, then, would researchers know if the difference in scores is enough to support their hypothesis? They would rely on the concept of statistical significance.

Statistical Significance (p. 59) *implies that the means of the groups are farther apart than you would expect them to be by random chance alone.*

If this study was replicated several times, members of the group who could text message would almost always report feeling less lonely.

But now imagine that the outcome is like the one on the right of the figure, where the scores overlap a great deal. That outcome would be nonsignificant, which means that if we did the study again, the outcomes for the groups might be reversed. Given how much overlap there is between the two distributions, small differences in mean scores will not be significantly different.

When we are describing these examples as significant or not significant, we are just making estimates based on the appearances of the scores. To determine whether their results are significant, researchers analyze data using a hypothesis test.

Hypothesis test (p. 59) *is a statistical method of evaluating whether differences among groups are meaningful or could have been arrived at by chance alone.*

The results of a hypothesis test will tell us if the two groups are significantly different (different because of the IV) with a certain degree of probability.

ANSWERS TO MODULE 2.4 QUIZ

2.4.1 B
2.4.2 C
2.4.3 A
2.4.4 C
2.4.5 A

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V. MODULE 2.5 SCIENTIFIC LITERACY CHALLENGE: SELF REPORTS

Have your students practice applying scientific and critical thinking to this chapter's Scientific Literacy Challenge. After your students read all relevant materials, have them evaluate the topics from a scientific literacy perspective through journal prompts and discussion.

CHAPTER IN FOCUS

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Text p. 37 Module 2.1 Principles of Scientific Research

ASSIGNMENT: **Working the Scientific Literacy Model**

After students read the chapter and view the video, (available in MyPsychLab) and assign the discussion topic found in the "Why is this relevant?" section as a classroom discussion or as a short-answer writing assignment through MyPsychLab.

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RESOURCES AVAILABLE FOR MODULE 2.1

Lecture Launchers and Discussion Topics

Psychology and Common Sense
The Tragedy of Dr. Semmelweis and Childbed Fever
Pseudopsychology and the Mozart Effect

Classroom Activities, Demonstrations, and Exercises

Learning Student Names
Small Samples
Experiment Design to Test Common-Sense Statements
Journal Browsing
Research and the Tabloids
Estimating the Frequencies of Our Own and Others' Behaviors
Can Science Answer This Question?
Study Plan for Module 2.1

WEB RESOURCES

Simeon's Cave of Magic and the Confirmation Bias
Discovering Psychology Episode: Judgement and Decision Making:
Stanford Encyclopedia of Philosophy

RESOURCES AVAILABLE FOR MODULE 2.2

Lecture Launchers and Discussion Topics

Outline of Research Process
The Phineas Gage Story
Case Studies of Vietnam War Experiences
Experimental and Control Groups
The Case of Joseph Goldberger and Pellagra
Independent and Dependent Variables
Oscar the Deathcat: A Case of Illusory Correlation?
An Experimental Example
Applied Experimental Psychology in the Real World
Designing a Research Study

Classroom Activities, Demonstrations, and Exercises

Observational Research in the Dining Hall
Naturalistic Observation
Correlating Shoe Size and Height
Quiz on Correlation Correlational and Experimental Research
Work the Scientific Literacy Model
Testing Random Assignment
Experimental Design: Developing a Testable Hypothesis
Equating Groups on Multiple Variables Using Randomization

Identifying the Parts of an Experiment
Understanding Correlations
Using Memory to Demonstrate Methodology
Give the Doctor Some Advice
Which Method Would You Use?
Name That Research Method
Study Plan for Module 2.2

Web Resources

Correlation Is Not Causation: Zero Calories and Same Great Taste (and Heart Risk):
Oscar the "Deathcat

RESOURCES AVAILABLE FOR MODULE 2.3

Lecture Launchers and Discussion Topics

APA Ethical Principles
Research Approval
An Historical Perspective on Research Ethics
The Road from Hypothesis to Conclusion
Is There Privacy in a Public Restroom?
Deception in Research Improving
Informed Consent Fairness,
Rightness, Chimpanzees
Animal Research
Animals in Psychological Research

Classroom Activities Demonstrations, and Exercises

Judging the Ethics of Researchers
What Do Journals Look Like?
Study Plan for Module 2.3

Web Resources

APA Code of Ethics:
Ethics and Animal Experimentation:
A History of Ethical Abuses:

RESOURCES AVAILABLE FOR MODULE 2.4

Lecture Launchers and Discussion Topics

Average, Variability, and Correlation

Classroom Activities, Demonstrations, and Exercises

Web Resources

LECTURE LAUNCHERS AND DISCUSSIONS TOPICS

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Text p. 33 Module 2.1 The Five Characteristics of Quality Scientific Research
DISCUSSION: **Can Science Answer It?** A discussion of the limitations of science.

Purpose: Students discuss the limitations of science.
Learning Structure: Focused Listing
Time: 15 minutes
Class Size: Appropriate for most class sizes

Description: Students are asked to generate a list of questions. Some of the questions should be able to be measured scientifically (e.g., Do people with freckles live longer?) while others cannot (e.g., would animals rather be put to sleep than die of natural causes?). Once students have completed their lists, they can pair with other students for discussion. Students may want to read the list and see whether their partner can determine which questions can or cannot be answered by science. With a large class, instructors may call on a handful of students to share their lists and generate discussion. Unfortunately, scientific methods cannot be used to answer every question about human behavior. With this activity, students can think about and discuss what questions make good candidates for scientific inquiry.

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Text p. 34 Module 2.1 The Five Characteristics of Quality Scientific Research
DISCUSSION: **Under the Influence**
This discussion topic encourages students to think about how different behavioral definitions influence a study's outcome.

A blood alcohol level of .08% or greater is widely used as a threshold for determining that a person is not fit to drive a car. But people differ greatly in their tolerance for alcohol. Would it make more sense to assess behaviors directly related to driving skill? What behavioral standards of driving fitness might be used? What would be the advantages and disadvantages of doing this?

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Text p. 35 Module 2.1 The Five Characteristics of Quality Scientific Research
PEER DISCUSSION: Online Polls
Many websites offer online polls that visitors can participate in. Students discuss the advantages and disadvantages of using these kinds of polls to collect data.

News websites like *cnn.com* and *foxnews.com* frequently poll their visitors on current event topics. The most obvious example of this occurs when websites ask their visitors whom 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 published 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?

Writing Prompt: 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.*

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Text p. 37 Module 2.1 Working the Scientific Literacy Model: Demand Characteristics and Participant Behavior

Lecture/Discussion: The Placebo Effect

The power of suggestion is powerful indeed. Consider the example of the placebo effect. During the 1950s, surgeons routinely performed a simple operation to relieve chest pain suffered by patients with angina pectoris. An amazing number of the patients—nearly 90 percent—reported relief from pain. An experimental study divided angina patients into two groups and informed them that they were going to have an operation that had a very high success rate in relieving angina pain. The actual surgery was performed on only half the patients. What was done with the other half would no longer be allowed according to ethical medical standards. The surgeons took the remaining half of the patients, put them under anesthesia, made the surgical incision in their chests, and then simply sewed them up again. When the patients awakened in the recovery room, they were told that the operation had been performed (Cherry, 1981). The patients who had the sham surgery did even better than the patients who had undergone the actual operation! Their pain had been relieved simply by the power of suggestion. Remind students of the aspirin study and ask why the researcher included a placebo.

Cherry, L. (1981, September). Power of the empty pill. *Science Digest*, 116, 60–67.

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Text p. 38 Module 2.1 The Five Characteristics of Quality Scientific Research

LECTURE LAUNCHER: **Scientific Journals, Their Formats, and Their Standards**

This lecture launcher calls on students to use their critical thinking skills to evaluate the difference between reports in the popular press and peer-reviewed material.

To evaluate the merits of published articles, the reader must use critical thinking skills. These skills do not come naturally; they must be learned. The standardized format used by most scholarly journals helps the critical reader find the information he or she needs to evaluate the research. In general, the format consists of the following sections: introduction, methods, results, and discussion. One way to differentiate popular magazines from journals is to see whether this format appears. Bring to class a journal or two for students to examine. (The APA publication manual gives more details.)

Scientific journals publish only those manuscripts that meet rigorous standards. Reasons for rejection include unethical treatment of subjects, results that do not contribute to the body of knowledge, inappropriate statistical techniques, poor use of research methods, confounding of variables, poor literature reviews, or poor writing. Conducting well-controlled, well-designed research, and writing the results in a straightforward, professional manner are not easy tasks.

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Text p. 38 Module 2.1 The Five Characteristics of Quality Scientific Research

LECTURE LAUNCHER: **Explaining a Behavior**

This lecture launcher asks students to consider how a behavior would be explained when using different study techniques.

To help students understand the differences between the various areas of psychological research, take an example, like obesity, and discuss how each major area would explain the causes and possibly the solutions to the problem. You could also use the example of drug abuse. This could be used as a classroom discussion or a writing assignment.

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Text p. 39 Module 2.1 Subjective Thinking: Anecdotes, Authority, and Common Sense

LECTURE LAUNCHER: **Psychology and Common Sense**

This lecture launcher asks students to consider why psychology is not just all about common sense.

A common refrain voiced by laypeople and scientists is that most, if not all, of behavioral science "is just common sense." Introductory psychology students are particularly apt to make this claim, given that much of their prior exposure to psychology is likely to have been very commonsensical (though perhaps not well-established) claims by a variety of "professionals" on the talk-show circuit. In a nutshell, it's difficult to counter the "common sense" stigma when so much of behavior seems to be explainable at an intuitive surface level.

Mark Leary shares some suggestions for discussing this issue with your students. It is true that the subject matter of psychology is much more familiar to most people than is the subject matter of subatomic physics or gastroendocrinological biology; we see behavior all around us, but rarely stumble over a gluon. Psychology would be an odd science of thought and behavior if it considered only thoughts and behaviors completely foreign to people's experiences, or if its findings always ran counter to most people's beliefs. But neither greater visibility of subject matter nor popular consensus guarantees greater understanding. Many people believed whole-heartedly in flat earths and cheese moons, only to find their commonsense views dismantled in the face of scientific evidence. So too with psychology. Although most people would like to believe that large rewards produce greater liking for a boring task, that the behavior of men and women is determined by their biology, or that absence makes the heart grow fonder, researchers studying cognitive dissonance, sex-role stereotypes, and close relationships would be happy to share their findings to the contrary. In short, the popularity of a commonsense belief may not always support the weight of scientific evidence.

More importantly, psychologists (like all scientists) are primarily engaged in the task of explaining behavior, rather than merely cataloging it. The difference between theory and description—"why" versus "what"—echoes the difference between science and common sense. Common sense certainly helps describe what takes place in behavior, but it doesn't compel us to understand why it takes place. The development of theory in understanding behavior sets science apart from every day, commonsense accounts.

Leary, M. (1995). *Behavioral research methods* (2nd ed., pp. 24–25). Pacific Grove, CA: Brooks/Cole.

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Text p. 39 Module 2.1 Subjective Thinking: Anecdotes, Authority, and Common Sense

Lecture/Discussion: The Tragedy of Dr. Semmelweis and Childbed Fever

The case of Dr. Ignac Semmelweis and childbed fever complements the debacle surrounding the technique of facilitated communication and powerfully illustrates the tragedies that ensue when scientific information is ignored or rejected. It is an extraordinary story that is as much psychological as it is medical. In 1847, Semmelweis attempted to persuade his fellow physicians that they were contaminating women during childbirth with some substance acquired from the cadavers of women who had died from this illness. When his own students washed their hands in an antiseptic, the death toll plummeted, but his fellow physicians disbelieved this clear and objective evidence. Describe the case and ask students why the medical community was so reluctant to accept Semmelweiss's findings. A brief presentation on cognitive dissonance theory may be helpful. That is, after watching women perish from this gruesome infection, the physicians' knowledge that they had caused these deaths may have been too discrepant with their self-concepts as healers to resolve the dissonance. They disparaged Semmelweis and his evidence. The story may be found in the following source:

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Text p. 39 Module 2.1 Subjective Thinking: Anecdotes, Authority, and Common Sense

Lecture/Discussion: Pseudopsychology and the Mozart Effect

Before discussing pseudoscience, ask students about their impression of the so-called Mozart effect. Most students have heard of the general phenomenon and have seen advertisements and CDs of music "designed to increase your children's IQ." Bring in a magazine advertisement and read from it, touting the merits of the product. Ask students if they believe it, and if they would buy the product. Probe them by asking what "proof" they would need that the product actually works. Usually, students will begin to question the merits of the product, at which point you can discuss the actual psychological findings of this moneymaking gimmick by summarizing the work of Steele, Bass, and Crook (1999).

Pseudoscience quite literally means "false science." Its "claims [are] presented so that they appear scientific even though they lack the supporting evidence and plausibility" (Shermer, 1997, p. 33). Furthermore, pseudoscience appears to use scientific methods and tries to give that "science-y" impression. Some characteristics of Pseudoscience include the following:

associates itself with true science

relies on and accepts anecdotal evidence

sidesteps disproof

any possible outcome is explained away
a theory is not a good theory if it can explain everything because it can never make specific predictions

dangerously reduces complexity to simplicity (to a consumer society)

Ask students why the Mozart effect would be considered pseudoscience based on the 4 aforementioned characteristics. Have students give other examples of possible pseudoscience such as graphology, palmistry, aromatherapy, and quite arguably Eye-Movement Desensitization and Reprocessing (EMDR).

Steele, K.M., & Bass, K. E., & Crook, M. D. (1999). The mystery of the Mozart effect: Failure to replicate. *Psychological Science, 10,* 366–369.
Shermer, M. (1997). *Why people believe weird things: Pseudoscience, superstition, and other confusions of our time.* New York: W. H. Freeman & Co.

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Text p. 42 Module 2.2 Scientific Research Designs
OUTLINE/HANDOUT FOR DISCUSSION: **Outline of Research Process**
This outline provides a good description of the entire research process, from theory to analysis.

The goal of this information is to improve students' critical thinking skills. You will teach them about the importance of the scientific method, of controls necessary in psychology research, and of protections for research subjects. Your students will learn how to ask the right questions, how to evaluate answers about causes, consequences, and correlates of psychological phenomena. Ultimately, this information should make your students wiser, more skeptical consumers of scientific information, in general, and of psychological information specifically. They can refer to this handout throughout the course

The Process of Research

The initial phase often begins with direct observation and a new way of thinking about a phenomenon. Sometimes it stems from "great unanswered questions" in traditional parts of the field.
Theories are used in science to organize concepts to explain and otherwise advance our understanding of phenomena. They also allow us to test predictions about particular phenomena.
Determinism is an important concept in the philosophy of science, and it rests at the core of psychology. It is the belief that all events (physical, mental, or behavioral) are determined by specific causal factors. Because of determinism, all behavior and mental processes must follow lawful patterns. Psychologists attempt to reveal these lawful patterns in psychological principles. Determinism dictates how psychologists and other scientists conduct research.
Hypotheses are tentative, testable predictions about the relationship between causes and consequences (e.g., how two or more variables are related). Scientists test hypotheses through research using the scientific method.

The scientific method demands that psychological researchers have an open, critical, skeptical mind. This open-mindedness makes conclusions provisional, subject to modifications through hypothesis testing and by subsequent findings, and makes researchers open to new and controversial ideas.

When data collected through quality psychological research conflicts with the opinions or ideas of experts, the data always outweighs opinions.

The **scientific method** is a set of procedures for gathering and interpreting evidence in ways that help ensure that psychological research generates valid, reliable conclusions by minimizing sources of error.

Psychology is considered a science to the extent that it follows the scientific method to minimize subjectivity.

Public verifiability is fundamental to psychology. Secrecy is forbidden. Psychologists must have the opportunity to inspect, criticize, replicate, or disprove the data and methods of other researchers.

Observer bias is an error in data collection or data reporting that is due to the personal motives and expectations of the viewer. Personal biases of observers act as filters through which some things are noticed as relevant and significant, while others are ignored as irrelevant and unimportant.

Standardization: The Remedy for Observer Bias

Standardization means using uniform procedures in all phases of the research process. All participants should experience exactly the same procedure, and other researchers should be able to replicate the procedure exactly.

An *operational definition* explains a variable of condition in terms of its measurement, operation, or procedure used to determine its existence in the research setting. All variables in an experiment must be given an operational definition. For example, "depressive mood" may be defined as a set of symptom scores derived from a specific questionnaire.

A variable is any factor in an experimental setting that varies in amount or kind. Depressive mood is an example of a variable. Participants' scores can vary from high to low.

Independent variables are manipulated by the experimenter and are free to vary. They can be defined as the *predictor variable*s in non-experimental (e.g., correlational) research.

Dependent variables are those whose values result from changes in independent variables. They can be defined as outcome variables and are the variables that are predicted in nonexperimental research.

Experimental Methods in Psychology

The *experimental method*—used to overcome causal ambiguity—manipulates an independent variable and then looks for an effect on a dependent variable. In the Figure 2.3 example, an experimenter varied "arousal" (independent variable) to test its effects on memory performance (dependent variable).

Initial explanations of experimental results often lead to ***alternative explanations***. The more alternative explanations that exist without refutation, the less confident a researcher can be that his or her predicted explanation or hypothesis is the correct one. Alternative explanations can be limited by experimental controls.

Confounding variables create one set of potential alternative explanations. They exact extraneous influence during an experiment that can unwittingly affect experimental results. If not accounted or controlled for, researchers cannot be certain whether the

experimental manipulation, or a confounding variable, is responsible for the results.
Two types of confounds apply to almost all experiments:

Expectancy effects occur when a researcher subtly communicates to the subject the results that he or she expects. Participants may then behave in the desired manner.

Placebo effects occur when human participants' beliefs about the efficacy of a procedure lead to improvement in the participant. Participants can be given chemically inert pills, and, if they believe that the pills will make them improve, participants often do improve, due simply to the placebo effect. In many studies, about one third of participants are found to be positive placebo responders.

Control procedures attempt to hold constant all potential confounding variables and conditions.

Types of control procedures

A *double-blind control* refers to a procedure in which both the subject and the experimental assistant administering a treatment are unaware of the experimental condition to which the subject is assigned.

A *placebo control* is an experimental condition in which human participants believe that they are receiving a treatment that may be effective, but in which they are actually receiving a treatment that is known not to be effective. By comparing the placebo control group with the group of participants that received the actual treatment, researchers can determine how much change in the dependent variable is due to participant beliefs versus the treatment itself.

Research designs: Properly designed experiments ensure that alternative explanations are kept to a minimum. Well-designed research can incorporate conditions that test confounding variables with the primary ones.

Random assignment is one of the most important aspects of research design. It helps ensure that subjects are similar in each experimental condition, because each participant has the same chance of being in each condition.

A *population* is the entire group of individuals to which researchers will generalize their conclusions. Testing an entire population is typically impossible. Hence, it is important to enroll a *representative sample* (a subgroup with similar characteristics as the larger population) from the population of interest in order to generalize research results. This is achieved by randomly recruiting participants from the larger population (e.g., random digit dialing for scientific political polling).

In *between-subjects designs*, participants are randomly assigned to experimental group(s) (e.g., different treatments) or control group(s) (subjects are not exposed to the treatments). This allows researchers to account for alternative explanations. However, each participant is only in one condition.

In *within-subjects designs*, each participant serves as his or her own control group, as they are exposed to both control and experimental conditions. By comparing the difference in each participant's response between the control (e.g., neutral) and treatment conditions, researchers can determine the efficacy of treatment much more accurately (see Figure F3, Children Learning Emotional Responses).

Correlational methods determine to what extent two variables, traits, or attitudes are related.

The standard measure of correlation is a statistic called a *correlation coefficient*, represented by "*r*." *r* can vary between -1.0 and +1.0, where -1.0 represents a perfect negative correlation, and +1.0 represents a perfect positive correlation. A correlation of 0 indicates that there is no relationship between the variables. In much research on personality traits, *r*'s are modest – between .10 and .30.

A *positive correlation* means that as one set of two scores increases, so does the other set. For example, as height increases, weight also tends to increase.

A *negative correlation* means that as one set of scores increases, the other set decreases. For example, as physical exercise increases, weight often decreases.

However, *correlation does* not *imply causation*. Simply because a researcher finds that two variables are related does not mean that one variable necessarily causes the change in the other variable. For example, increased sleep does not necessarily lead to increased GPA among college students. It is difficult, if not impossible, to know which variable may be "causing" change in the other, and there is always the possibility that a third, unknown, variable influences change in both (e.g., the mediating variable).

Subliminal influence: Psychological researchers have used the experimental method to demonstrate that subliminal messages offer nothing more than placebo effects.

II. Psychological Measurement

Reliability and **validity:** goals of psychological measurement

Reliability refers to the consistency or dependability of research results. If we consider throwing darts at a dartboard, reliability would be measured by how closely the darts group together. If the darts reliably hit the same spot, even if it is not the bull's-eye, the throws are reliable.

Validity refers to how accurately the research measures the variable under study. Again considering throwing darts, validity would be measured by how closely the darts came to the spot that the thrower intended to hit. If you wanted all of your darts to hit the bull's-eye and they did, your throws would have been both valid (they hit the intended mark) and reliable (all of them hit the same mark).

Self-report measures are written or spoken responses to questions posed by the researcher.

A *questionnaire* is a self-report measure on which a respondent replies to a written list of questions.

Questions on self-report measures may be *open-ended*, which allow respondents to answer freely in their own words; or

Fixed alternatives, which provide respondents with a number of alternatives from which to choose (e.g., "yes," "no," "undecided").

An *interview* is an interactive dialogue between a researcher and participant used for obtaining detailed information. Good interviewers establish positive rapport with interviewees, which facilitates honest self-disclosure.

Behavioral measures and observations are ways to study overt actions and recordable reactions

Planned, controlled, systematic *observation* is an important source of behavioral data.

Direct observation involves observation of behavior that is clearly visible and easily recorded.

Naturalistic observation occurs in a natural setting (e.g., a playground) rather than in an artificial, highly contrived laboratory setting.

Case study research focuses on a single individual rather than on large numbers of participants.

III. Ethical Issues in Human and Animal Research

At the core of the ethical treatment of both human and animal research subjects is the question, "Do the potential gains from the proposed research outweigh the expected or potential costs of the subjects' participation?" Colleges have established independent research review boards to guide researchers in making this decision, and the American Psychological Association (APA) has established guidelines to ensure that research is conducted ethically. For humans, guidelines include the following:

Informed Consent: Whenever possible, participants must be informed about the nature of the experiment in which they may participate and, after being informed, must consent to participate. They are also informed that their consent is conditional and that they can withdraw it at any time without penalty or prejudice.

Risk/Gain Assessment: Researchers have a responsibility to weigh potential risks of an experiment against its potential benefits. They also have a responsibility to do everything in their power to minimize risk to participants, whether they are human or nonhuman, and to optimize the possible benefits to the participants and to society.

Intentional Deception: APA guidelines clarify that intentional deception is justified only if

- the study has sufficient scientific/educational importance to warrant it;
- there is no equally effective alternative to conduct the research;
- the deception, and the reasons for it, is fully explained to the participants at the conclusion of the research; and
- participants must have the choice to withdraw their data once the deception is explained.

Debriefing: At the conclusion of research participation, each participant must be told the rationale for the experiment. This debriefing gives the participant an opportunity to learn about psychology and themselves, and allows them to appreciate more fully their experience in the experiment.

Issues in Animal Research

- Examples of the benefits of animal research include development and assessment of drugs that treat mental illness and diseases that affect behavior (e.g., Parkinson's disease); knowledge about drug addiction and neuromuscular disorders; and possible treatments for AIDS. Animal research not only benefits humans but has led to many important vaccines for animals as well.
- Despite these accomplishments, some believe that it is immoral and inappropriate to use animals in research because animals cannot be informed about the nature of research and thus cannot give their informed consent, as the APA requires with humans.
- Because of the sensitive nature of the debate and the fact that animals cannot give informed consent, reasoned proponents of animal rights create a moral context in which individual researchers must judge their research under the highest level of compassion and scrutiny.
- The APA has set strict guidelines for the treatment of nonhuman participants.

IV. Becoming a Wiser Research Consumer

Critical thinking goes beyond mere information collection with the goal of understanding substance without being seduced by style. Some general rules to keep in mind to be a more critical thinker include the following:

Avoid the assumption that correlation means causation. It does not.

Ask for operationally defined concepts to ensure understanding of their meaning.

Before seeking confirming evidence for a theory, look for disconfirming evidence. Confirming evidence is easy to find when you are looking for it.

Always seek the most parsimonious alternative explanations that explain results more simply or completely, especially when researchers have a stake in the proposed explanation. Occam's razor is a rule of thumb that proposes that parsimonious, simple explanations are preferable to complex ones.

Be alert for signs that personal biases may have distorted the research process and findings.

Be suspicious of simple answers to complex problems.

When confronted with claims that something is more effective, better, or superior, be sure that you understand to what it is being compared.

Maintain an open mind and a healthy skepticism. All conclusions are subject to revision, and some truly novel, bizarre ideas will be correct.

Challenge authority that is unjust, values opinion over evidence, and is not open to constructive criticism.

All of these suggestions should be applied information you learn in your college courses, including that which is presented in ***Psychology and Life.***

Statistical Analysis of Data

Through statistical analysis, researchers are able to test their hypotheses based on the **raw data** they collect. Psychologists rely on two types of statistics in analyzing the results of their research: descriptive and inferential.

Descriptive statistics: simple mathematical procedures for summarizing data and describing their representative sample of participants

A *frequency distribution* provides a summary of how frequently scores in a data set occur (e.g., on Item 1 on a questionnaire, how many respondents answered "yes" versus "no"). Distributions are often represented in graphic form for an easier interpreted summary of data.

Graphs allow for the visual presentation of patterns in data.

Measures of central tendency provide a summary of a typical score obtained in a group of respondents.

Mode: a score that occurs more often than any other.

Median: a central score in a distribution. It separates the upper from the lower half of scores.

Mean: another central score. It is the average score.

Variability summarizes the distribution in a set of values, and is derived by the difference between the highest and the lowest score in the set (the range).

Standard deviation provides another summary of a data set's variability and is often described together with the mean. It is the average difference of a set of scores from their mean.

Correlation coefficient indicates the nature and strength of a relationship between two variables. Coefficients range from +1 to –1. Larger (stronger) coefficients (either + or –) allow for the greatest predictability.

Inferential statistics: mathematical procedures, based on probability theory, that describe the likelihood that certain variables predict changes in others, and to infer which conclusions can be legitimately drawn from the data.

Normal curve properties are the basis of the most basic inferential statistics. When a large data set is collected, responses will often fit a normal curve (e.g., height of 1,000 freshman), and differences in scores are only chance differences as reflected in the *normal distribution* of scores. In a normal distribution, the mean, median and mode are the same. A hypothetical normal curve is often used to test the null hypothesis, or the hypothesis that two or more samples of scores will be the same.

Significant difference: This is a difference between two sets of scores that are unlikely to be due to chance alone. Researchers can set the probability level of determining a significant difference, but most often, this probability is $p<.01$ (less than 1 in 100) or $p<.05$ (less than 5 in 100.

Statistical tests of significance: There are many inferential statistics that are used to estimate the statistical significance in a data set. The type chosen depends on the design of the research, the research question, the form of the data collected, and the size of the representative sample used in the research.

t-test: This statistic is one example of inferential technique used to determine whether the means from two groups of scores are similar (vary only by chance) or are significantly different from one another (their difference is likely not a chance difference). If a *t*-test generated a probability of $p=.003$, a researcher would be confident that the difference in the means of the two sample data sets are truly different, and not different just because of chance.

To be a wise consumer of statistics, it is important to view statistical data in terms of probabilities and not fact. Statistical results are only as reliable and valid as the data that were collected. Hence even descriptive statistics can be affected by sampling and experimental biases. Moreover, inferential statistics should be viewed with certain skepticism until results are replicated.

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Text p. 43 Module 2.2 Descriptive Research

LECTURE LAUNCHER: **The Phineas Gage Story**

This lecture launcher provides a detailed history of the famous case study of Phineas Gage.

The journal *History of Psychiatry* reprinted the original presentation of the case study of Phineas P. Gage, noteworthy in psychology for surviving having an iron tamping rod driven through his skull and brain. The case notes, by physician John M. Harlow, reveal aspects of the event that provide greater detail about Gage and his unfortunate accident.

Phineas Gage stood five feet six inches tall, weighed 150 pounds, and was 25 years old at the time of the incident. By all accounts this muscular foreman of the Rutland and Burlington Railroad excavating crew was well-liked and respected by his workers, due in part to "an iron will" that matched "his iron frame." He had scarcely known illness until his accident on September 13, 1848, in Cavendish, Vermont. Here is an account of the incident, in Harlow's own words:

> He was engaged in charging a hold (sic) drilled in the rock, for the purpose of blasting, sitting at the time upon a shelf of rock above the hole. His men were engaged in the pit, a few feet behind him. . . . The powder and fuse had been adjusted in the hole, and he was in the act of 'tamping it in,' as it is called. . . . While doing this, his attention was attracted by his men in the pit behind him. Averting his head and looking over his right shoulder, at the same instant dropping the iron upon the charge, it struck fire upon the rock, and the explosion followed, which projected the iron obliquely upwards . . . passing completely through his head, and high into the air, falling to the ground several rods behind him, where it was afterwards picked up by his men, smeared with blood and brain.

The tamping rod itself was three feet seven inches in length, with a diameter of 1¼ inches at its base and a weight of 13¼ pounds. The bar was round and smooth from continued use, and it tapered to a point 12 inches from the end; the point itself was approximately ¼ inch in diameter.

The accounts of Gage's frontal lobe damage and personality change are well-known, and are corroborated by Harlow's presentation. Details of Gage's subsequent life (he lived 12 years after the accident) are less known. Gage apparently tried to regain his job as a railroad foreman, but his erratic behavior and altered personality made it impossible for him to do so. He took to traveling, visiting Boston and most major New England cities, and New York, where he did a brief stint at Barnum's sideshow. He eventually returned to work in a livery stable in New Hampshire, but in August 1852 he turned his back on New England forever. Gage lived in Chile until June of 1860, then left to join his mother and sister in San Francisco. In February 1861, he suffered a series of epileptic seizures, leading to a rather severe convulsion at 5 A.M. on February 20. The family physician unfortunately chose bloodletting as the course of treatment. At 10 P.M., May 21, 1861, Gage eventually died, having suffered several more seizures. Although an autopsy was not performed, Gage's relatives agreed to donate his skull and the iron rod (which Gage carried with him almost daily after the accident) to the Museum of the Medical Department of Harvard University.

Miller (1993) also briefly notes that John Martyn Harlow himself had a rather pedestrian career, save for his association with the Gage case. Born in 1819, qualifying for medical practice in 1844, and dying in 1907, he practiced medicine in Vermont and later in Woburn, Massachusetts, where he engaged in civic affairs and apparently amassed a respectable fortune as an investor. Like Gage himself, Harlow was an unremarkable person brought into the annals of psychology by one remarkable event.

Harlow, J. M. (1848). Passage of an iron rod through the head. *Boston Medical and Surgical Journal*, 39, 389–393.

Harlow, J. M. (1868). Recovery from the passage of an iron bar through the head. Paper read before the Massachusetts Medical Society.

Miller, E. (1993). Recovery from the passage of an iron bar through the head. *History of Psychiatry*, 4, 271–281.

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Text p. 43 Module 2.2 Descriptive Research
Lecture/Discussion: Case Studies of Vietnam War Experiences

An excellent example of how the case study works in psychological research is the work of Lambright (2003), who studied the responses of six Vietnamese volunteers (varying in age from 24 to 68) to the disruption in their daily lives, occupations, and the cultural adjustments brought about by the war in Vietnam. She conducted the interviews individually, in different locations throughout Vietnam during June and July of 2002. The six volunteers, from whom she obtained written consent, answered seven questions. While the standard seven questions might suggest that this face-to-face interview was a highly structured one, Lambright was in fact free to follow up any interesting answers with more questions as the need arose, making the interview an unstructured one. Here are two brief excerpts from those interviews, answers to the question "What about your culture explains its resilience during sustained disruption (such as war, famine, social and political crises)?"

(Nguyen Ban, 24) "A happy stable family takes care of each other…we all overcome together. We have a solid base to stand on… The Vietnamese are very flexible, adaptable to the situation. They are resilient; in the hard time they are unified and come together in a community to fight against the enemy…"

(Le Minh Viet, 68): Resilience, without the ability to adapt under circumstances, we wouldn't have survived the Chinese domination, the French, and all the wars over the centuries. Circumstances shape the attitudes, the emotions, and the behaviors. All of us are used to war situation and became acclimated so it minimizes trauma."

Notice that while both interviewees stress the adaptability of the Vietnamese, the younger Nguyen seems focused on how Vietnamese people might react in some future conflict—Nguyen did not live through wartime. The older Minh did experience the war, and talks more about how the past affects his culture now. This kind of detailed information is possible only in a case study style of research. Mere observation would not provide the answers to Lambright's questions.

Interview Questions:

What about your culture explains its resilience during sustained disruption (such as war, famine, social and political crises)?

What lessons have been learned as a result?

How have these lessons been integrated into the current society?

Can you share some examples of adjustment to the turmoil, examples known within your area of expertise or with which you are personally familiar?

Can you give examples of maladjustment known within your area of expertise or with which you are personally familiar?

In thinking about your answers, what do you see as being particular to the Vietnamese culture that explains your response to the above questions?

Is there anything else you would like to add to this interview?

Lambright, L.L. (2003) Paper presented at International Conference, Midwest Institute for International/Intercultural Education, Cleveland, Ohio, April.

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Text p. 45 Module 2.2 Experimental Research

LECTURE LAUNCHER: **Experimental and Control Groups**

This lecture launcher introduces students to published research and asks them identify methodological terms.

Use this example to illustrate the difference between experimental and control groups.

A researcher wanted to find out whether aspirin or acetaminophen was best for relieving headaches. She went to a shopping mall and asked people whether they had headaches or not. Those who did were given the opportunity to participate in her study. In a room especially prepared for the study, she gave each participant a capsule containing aspirin, acetaminophen, or a placebo or no capsule. She determined which to give to each participant by random assignment. Next, participants were instructed to lie down in a dark room for an hour. After the hour had passed, the researcher asked whether the participant still had a headache. What are the independent and dependent variables in this study?

Remind the students to use the "X causes Y" statement. Ask what would be X (type of medicine), then ask what would be Y (relief of headache after one hour). Next, ask whether the research can conclude that different medicines caused different results if, indeed, one group has fewer remaining headaches than the others. Use this discussion to point out the purpose of random assignment (equalize relevant variables, such as chronic illnesses, across groups) and the purpose of holding environment and activity (lying down in a dark room) constant across groups during the period in which the medicines should be exerting their physiological effects.

You can also use this example to teach students about experimental and control groups. A study examining the effects of colorization of black-and-white movies is a simple, yet effective, case of the difference between independent and dependent variables and subject groups. Cutler, Dalseide, Plummer, Bacon (1988) presented the movie *It's a Wonderful Life* to two subject groups. The experimental group saw the colorized version; the control group saw the original black-and-white version. The participants rated their version on humor, interest, action, and acting (dependent variables). (There was no significant difference!)

Cutler, G. H., Dalseide, A. R., Plummer, V. H., & Bacon, C. R. (1988). Subjective reactions to a colorized movie vs. its original black/white version. *Perceptual and Motor Skills, 66,* 677–678.

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Text p. 45 Module 2.2 Correlational Research

Lecture/Discussion: The Case of Joseph Goldberger and Pellagra

The case of Joseph Goldberger and pellagra is another powerful, true-life story from the history of medicine that shows how the correlation between this disease and poverty obscured the true causal mechanism: Poor diet. Early in the twentieth century, diets deficient in niacin killed many poor Southerners. Dr. Joseph Goldberger discovered the cause of the disease and generated controversy by demonstrating that it was not caused by germs. Because cases of pellagra were often higher among those

with poor sanitation (e.g., no indoor plumbing), contamination by means of germs was the favored theory, a clear case of mistaking correlation for causation. In his attempt to discover the true cause, Goldberger experimented on himself, his colleagues, his wife, and prisoners. The case also raises important ethical questions; that is, to what extent did prisoners feel coerced into participating? It is worth mentioning that Goldberger exchanged pardons for participation in his medical research. Goldberger's ideas were not universally well received and some were reluctant to accept his findings. For example, Goldberger accurately predicted that the drop in cotton prices in 1920 would lead to increased poverty and cases of pellagra. In anticipation of this outcome, he argued for social programs to improve nutrition in the South. In response, he was accused of impeding tourism and discouraging economic investment in the region by some Southerners, memorably led by then-congressman Jimmy Byrnes.
The following link leads to information on the case.

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Text p. 45 Module 2.2 Correlational Research
Lecture/Discussion: Independent and Dependent Variables

In the following cereal and fruit example, the cereal and the fruit are independent variables and the rash is the dependent variable. One useful way of thinking about and identifying independent and dependent variables is to remember that the basic hypothesis underlying any experiment is "X causes Y" (coloring a movie [X] changes the way people respond to it [Y]; a cereal [X] caused a rash [Y]; a fruit [X] caused a rash [Y]). To test such hypotheses, X is manipulated in order to determine its effect on Y. Thus, X is the independent variable and Y is the dependent variable. Advise students that, when trying to identify independent and dependent variables (as might happen in the context of an exam question), they should put the variables in the scenario into an "X causes Y" statement.

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Text p. 45 Module 2.2 Correlational Research
Lecture/Discussion: Oscar the Deathcat: A Case of Illusory Correlation?

Historically, a number of superstitions have been associated with cats. For a brief summary, see the Committee for the Scientific Investigation of Claims of the Paranormal:
During the summer of 2007, the story of "Oscar the Deathcat" hit the Internet. The story originated in an article written for the *New England Journal of Medicine* (and also in *Slate Magazine*). It is possible that Oscar can predict the deaths of the elderly and infirm, but extraordinary claims such as this require extraordinary evidence. Students should consider one additional causal mechanism: That Oscar the Deathcat is another superstitious belief due to an illusory correlation. Note that although the article on Oscar was published in the *NEJM*, it was NOT a peer-reviewed article! Students may want to consider the degree to which the *Journal*'s prestige and the author's professional status conferred credibility to the story of

Oscar. The original *NEJM* and *Slate* articles links are listed here; a link to a video presentation on Oscar is listed in the Media Resources section.

New England Journal of Medicine:
The story was also covered in *Slate Magazine*:
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Text p. 46 Module 2.2 Experimental Research
Lecture/Discussion: An Experimental Example

Can vitamins increase IQ?

Suppose you hear about a retarded boy who did better schoolwork after being given a dose of a vitamin-mineral supplement, and you decide to conduct an experiment to see if intellectual functioning of retarded children can really be improved by such a diet supplement. You start with the hypothesis, "A vitamin-mineral supplement (independent variable) added to the diet of mentally retarded children will improve their intellectual functioning (dependent variable)."

Your first task is to define your variables more precisely. What vitamins and minerals will you use, and at what strength? How many times a day and for how many months? You may decide to use an IQ test score as a numerical measure of your dependent variable; you may also decide that you will require a minimum increase in the number of points as acceptable evidence of improvement, because many chance factors can influence test scores.

You draw your subjects from a group of children who have all been tested and diagnosed as mentally retarded, and you randomly assign them to either the experimental group, who will get the supplement, or the control group, who will be given a placebo (some inert substance) instead of the supplement.

There are several precautions you will need to take to avoid bias in your results. Besides controlling for similarity of your two groups at the start, you will want to be sure that the subjects in both groups are exposed to all the same conditions during the experiment except for the exposure to the independent variable, the nutritional supplement. Temperature, timing, instructions, conditions of testing, and other events during the time of the experiment should be as similar as possible for the two groups.

Your own desires to prove or disprove the idea that vitamins may increase school performance may be a possible source of bias. To reduce this bias, would you conduct a single-blind or double-blind experiment?

For a fixed period of time, say four months, the children in the experimental group receive the supplements in tablets at each meal. The control-group children also receive tablets, but they contain nothing of biological value (a placebo). Neither the children nor those working with them or testing them know which child is getting which kind of tablet. At the end of the four months, intelligence tests are given again to see if the groups now differ.

You may find that both groups have higher scores than originally, perhaps from all the extra attention they have been receiving or from some natural development over this period. So you use the control group's scores as a baseline and compare the experimental group's scores with that baseline.

If you find no difference, the study may end there, or you may try variations, perhaps a stronger supplement or a longer time period or subjects who are less retarded.

If you do find a difference in your original study, you will evaluate the probability that your obtained difference could have occurred by chance alone, even without the independent variable. If it is unlikely that it is a chance finding, your confidence in the hypothesis is increased.

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Text p. 46 Module 2.2 Experimental Research

Lecture/Discussion: Applied Experimental Psychology in the Real World

Students often have difficulty understanding how general research results can be applied to the real world. In other words, "How does this relate to me?" The following example provides connections between basic research in sensation and perception and possible military or medical errors.

A number of devices use sound (beeps, clicks, etc.) to provide feedback regarding bodies, structures or machines. These sounds are designed to provide people with information about changes in the current situation. For example, in medicine, drops in heart rate or blood pressure are signalled with beeps. Jet pilots receive information regarding positioning in the form of sounds as well. The pupose of these devices is to provide immediate auditory feedback that signals potential problems. The auditory nature allows the surgeon or pilot to be visually focused on something else at the time.

Unfortunately, results of recent research (Neuhoff, Kramer, and Wayand, 2002) suggest that people often misperceive how sounds change when both their pitch and loudness change. 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 him or her of 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 initial assumptions of inventors/creators of these systems regarding the accuracy of human interpretations of the sounds 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*, Vol. 8. No.1

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Text p. 47 Module 2.2 Experimental Research

DISCUSSION TOPIC: **Designing a Research Study**

This discussion asks students to think about designing a research topic around a controversial question.

Considering what you have learned about descriptive, correlational, and experimental research, how might you go about designing a research study (or a series of studies) to answer the questions:

Does pornography increase the incidence of sex crimes?
Are women more emotional than men?

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Text p. 50 Module 2.3 Ethics in Psychological Research
DISCUSSION: **APA Ethical Principles**
This discussion topic asks students to contemplate the APA ethical principles.

To what extent are the APA ethical principles governing research with human research participants adequate or inadequate? If they are followed, will they assure that research with humans is ethical? Are there other principles that you think should be added?

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Text p. 50 Module 2.3 Ethics in Psychological Research
DISCUSSION: **Research Approval**
This discussion topic asks students to consider the role of campus IRB committees.

Every college and university has at least one committee that must approve every research project that involves research on human beings and at least one other committee that must approve research projects that involve non-humans. Does the existence of such committees unnecessarily limit research? What are the advantages and disadvantages of having such committees? What should be the membership on such committees (what constituencies should be represented)?

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Text p. 50 Module 2.3 Promoting the Welfare of Research Participants
Lecture/Discussion: 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' 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.

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Text p. 50 Module 2.3 Promoting the Welfare of Research Participants
Lecture/Discussion: The Road from Hypothesis to Conclusion

How do we know that cigarette smoking is dangerous to your health?

Cigarette smoking became common in Europe after French and British soldiers picked up the habit from Turkish soldiers in the Crimean War of 1854 to 1856. The habit was adopted by a few Americans in the next 30 or 40 years. The tobacco was strong and they rolled their own. 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 are dangerous to health long before any research was done. The slang term for cigarettes, “coffin nails,” was used during the first half of the 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 high negative correlations between cigarette smoking and age at death: the more people smoked, the younger they were when they died.

This 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 is justified by correlational data. A relationship between variables does not imply that the variables are causally related. 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 careful 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 sample of 100 or so young people who have never smoked and assign them randomly to a smoking group and nonsmoking group. The smokers would smoke at least one package of cigarettes a day for life, beginning at age 16 or 18, 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 subjects died. If the nonsmokers lived significantly longer, the researchers would be justified in concluding that cigarette smoking *is* hazardous to health.

An experiment like this has not been done, and probably never will be done. In the 1970s the label on cigarette packages 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 conclusions that cigarettes are truly “coffin nails” is based on large amounts of data and a multitude of studies.

Many studies were required to get from a hypothesis to a firm conclusion in the establishment of a causal link between smoking and disease and death. The reason is that there are humane and ethical constraints that rule out certain types of research. Because humans are the primary focus in psychology, it is often difficult for us to get answers to important questions. As just one example of this, we would like to know if child abuse has permanent effects on personality, and if so, what these effects are. But we cannot assign infants at birth to be abused or not abused, so to study this question we must try to tease out these effects from the mass of environmental variables that affect the development of human personality.

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Text p. 51 Module 2.3 Promoting the Welfare of Research Participants
Lecture/Discussion: Is There Privacy in a Public Restroom?

In an infamous study of the correlates and consequences of invasion of personal space, Middlemist and colleagues measured latency to urinate and urination duration among men in public restrooms. In a pilot study, men designated as "subjects" were covertly observed urinating in a public restroom. Results indicated that onset of urination correlated negatively (r =.315) with the distance between the subject and another male using a nearby urinal. When only 1 urinal separated the men, mean latency of the subjects to urinate was 7.9 seconds; when 3 or more urinals separated the men, the latency was 5.7 seconds. Subsequently, an experimental study was carried out. Using a bucket and mop as props, urinals in a college restroom were blocked. Subjects were forced either to urinate at a urinal adjacent to a confederate or at a urinal separated by an "out-of-order" urinal between the two men. In a third control condition, no confederate was present. The subjects were observed and timed covertly by means of a "periscope" hidden within and monitored from a stall. Results revealed mean latencies to onset of urination of 4.9, 6.2, and 8.4 seconds within the control, moderate, and close distance groups. No subjects were ever informed that they had participated in a study. Clearly then, there was no attempt to obtain informed consent and no debriefing provided. Students may want to consider what possible harm could have resulted from such a study. Did subjects have a reasonable expectation of privacy in such a public setting? Could such a study have been done without the deception of the "secret recording"? Could such a study be carried out today?

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Text p. 51 Module 2.3 Promoting the Welfare of Research Participants
DISCUSSION: **Deception in Research**
This discussion topic asks students to consider the ethics of deception.

What is your position on the question of whether deception in research is justified? Under what circumstances do you think it is (or might be) justified?

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Text p. 52 Module 2.3 Promoting the Welfare of Research Participants
LECTURE LAUNCHER: **Improving Informed Consent**
This lecture launcher talks about a unique way to improve the process of obtaining informed consent from people with schizophrenia.

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. A recent 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. Wirsching 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.

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Text p. 52 Module 2.3 The Welfare of Animals in Research

LECTURE LAUNCHER: **Fairness, Rightness, Chimpanzees**

This lecture launcher introduces students to animal research demonstrating that perception of fairness is not just a human trait.

The "glue" that binds societies together is an implicit sense of equity, fairness, and rightness in our social dealings. The norm of reciprocity, for example, says that we should repay a favor with a favor, and can be found in sayings such as "one hand washes the other" or "you scratch my back, I'll scratch yours." The truth bias leads us to assume that most people are telling the truth most of the time. Social exchange theory is based on the notion that maximizing joint payoffs or having equitable reward-cost ratios is desirable. More generally, we expect people to honor a standard of being fair in their dealings with us and with others.

Research at Emory University suggests that these conceptions of fairness might have a genetic basis to them. Sarah F. Brosnan and Frans B. M. de Waal studied capuchin monkeys who were housed in pairs, and who had been trained to trade pebbles for pieces of food. If one monkey received a grape in exchange for her pebble, but the cagemate received a less-desirable piece of cucumber, the underbenefitted monkey would often refuse to eat the cucumber or turn over her pebble in exchange, both of which are unusual behaviors for monkeys. Moreover, emphatic body language (such as tossing the pebble or cucumber to the floor) would accompany this stonewalling. And, to really get the monkey's goat (to twist a metaphor), the underbenefitted monkey would go particularly nutty if she saw her cagemate receive a grape without having to trade in a pebble for it. Oh, the inequity of it all!

What's going on here? Brosnan and de Waal argue that monkeys have an implicit sense of fairness, and that they react demonstrably when their expectations of fairness are violated. Pebble for food: A deal's a deal. But a crummy old cucumber, or even the receipt of a reward without payment of a pebble . . . man, that ain't right! The fact that monkeys can convey their umbrage at this situation suggests a genetic basis for this sense of equity. Although schooling, socialization, and family modeling can shape the behavior, finding vestiges of it in nonhuman social primates raises the question of origins, and an interesting one at that. There is a genetic virtue to selfishness—it helps keep genes in the gene pool. But there may be a benefit, genetic in origin, to sharing equitably with one's fellows.

Wade, N. (Sept. 18, 2003). Genetic basis to fairness, study hints. *New York Times*, A21

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Text p. 52 Module 2.3 The Welfare of Animals in Research

LECTURE LAUNCHER: **Animal Research**

This lecture launcher presents a discussion of the benefits and concerns of animal research.

Much of what we "know" of human learning is based on research involving the study of animals other than humans. You may wonder why this is so. In brief, psychologists have sought to discover general laws of learning that hold true for all organisms. Learning theorists believe that much human learning should follow the same general laws and involve the same processes and variables as learning by chimps, cats, dogs, rats, pigeons, and even lower forms of life. These general laws would then be slightly modified for humans by merely changing the values of some constants or parameters in the equations but not the important variables themselves. As such, these researchers use a comparative approach in which they compare learned behavioral processes across different species.

But how can studying animals without the gift of language shed light upon human learning, which is so influenced by language and symbols? Modern learning theorist William Estes argues that precisely because of the importance of language in humans, analysis of human learning must be supplemented by the study of learning in other species. "In the normal human being," Estes argues, "we have no way of turning language off so as to determine how various aspects of learning are modified or controlled by linguistic processes. We can, however, discover how learning occurs in the vertebrate brain in the absence of language by studying animals. The idea is...to use the animal laboratory as a source of hypotheses and models to be employed as research tools in the analysis of human learning" (Estes, 1975. p. 1).

From studying conditioning processes in animals we can better infer what other nonverbal creatures, such as human infants, are perceiving and experiencing. For example, we know that any stimulus capable of producing a conditioned response is one the infant can perceive, such as a tone, light, or particular shape or figure. It is then also possible to determine the infant's capacity to detect different stimulus events in its environment (such as squares and rectangles) through use of conditioning procedures.

There are other reasons as well for using animals in some psychological research:

- Animals can be bred so that hereditary influences (their natures) are systematically controlled or known.
- Animals can be reared and maintained in special environments so that their experiences (their nurtures) are systematically controlled or known.
- Animals can be exposed to experimental treatments that may be noxious over an extended period of time.
- Animals may be sacrificed after the experiment to analyze the involvement of brain and other physiological systems.

Animals can be studied over many generations in longitudinal research because their life spans are shorter than the humans who study them.

Animals may have special abilities and behavioral patterns that are interesting to study in themselves (such as the transmission of particular songs among songbirds, or the way that bees communicate with each other about the location of food), or they may have abilities that can be usefully applied to human problems, as illustrated in the following project.

Because pigeons have the remarkable ability to take in a large visual field at one time, they are being used to aid Coast Guard air search and rescue operations. While human visual span is only about 2 degrees at a time, pigeons have a 70-degree span. In addition, they have exceptionally good color vision. These abilities are being put to use by the San Francisco Coast Guard.

Three pigeons are placed in a special chamber in the bottom of a helicopter. Each is positioned to scan a 120-degree sector of the horizon. The birds have been trained to detect orange, red, or yellow objects. Whenever they see one, they peck a response key and receive a pellet of grain. The response key sounds a signal to the helicopter pilot indicating which pigeon made the sighting. This information then guides the pilot in the direction of the detected object in the sea. "Pigeon power" may thus be harnessed to save human lives by (operantly) conditioning this incredible visual ability to detect many stimuli of human significance (San Francisco Chronicle, May 8, 1982).

Estes, W. K., ed. (1975). Introduction to concepts and issues. *Handbook of learning and cognitive processes*, Vol. 1, Hillsdale, NJ: Erlbaum.

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Text p. 52 Module 2.3 The Welfare of Animals in Research
Lecture/Discussion: Animals in Psychological Research

Should animals be used 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 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 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.

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Text p. 57 Module 2.4 Descriptive Statistics

LECTURE LAUNCHER: **Average, Variability, and Correlation** This lecture launcher summarizes the basic descriptive statistics.

In any discussion of research findings you occasionally hear the terms "average," "variability," and "correlation."

To describe a group's performance and to compare it with that of another group, you need two things: (1) a single number typical enough to represent the whole group of scores, and (2) a number that tells how different the scores are—how widely they vary.

The most typical number is a measure of central tendency, or **average.** The three kinds of average most often used are:

mean: sum of the scores divided by the number of scores,

median: the score in the middle when all the scores are lined up in order, and

mode: the most frequently occurring single score.

Measures of **variability** tell whether the scores cluster closely or are spread out. The measures of variability most often used are:

range: the scores from lowest to highest

standard deviation: a measure of the average variation of the individual scores from the group mean. The bigger the standard deviation, the more the scores vary from the mean score.

To describe the relationships between two sets of scores for the same individuals (intelligence and grades, for example), you use a statistical formula to obtain a **coefficient of correlation (r).** This statistic tells you whether two variables are related, if the relationship is positive or negative, and how strong or weak it is.

Coefficients of correlation range from +0.0 to +1.0.

A minus one (–1.0) correlation would mean perfect negative correlation (as horsepower gets higher, gas mileage gets lower).

A zero (0.0) correlation would mean no correlation at all. A plus one (+1.0) would mean perfect positive correlation (as intelligence goes up so do grades).

Perfect correlations are rarely found. A moderate correlation (either + or –) is between .25 and .60, and a high correlation is one between .60 and .99. Predictions can be made equally well from positive or negative correlations.

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CLASSROOM ACTIVITIES, DEMONSTRATIONS, AND EXERCISES

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Text p. 33 Module 2.1 The Five Characteristics of Quality Scientific Research
ICEBREAKER/ACTIVITY: **Learning Student Names**
This icebreaker focuses on research design and the importance of mnemonics.

Often both teachers and students wish to know each other's names for facilitation of classroom learning and activity. Smith (1985) provides a nice exercise in creating mnemonics for students' names, as well as getting students to begin thinking about research methodology. This exercise works well during the first week of class and provides a powerful demonstration of the effectiveness of mnemonics. This works best with a class size between 20 and 40.

Start off by taking attendance, then ask students "Do you think you can remember everyone's name in here … first *and* last names?" Usually, the response is "no way." Then briefly discuss the importance of remembering names in a social context. Next ask the students to define a mnemonic and provide examples. Students typically describe the first letter technique for remember the musical scale, "Every Good Boy Does Fine," or "HOMES" for the Great Lakes. Then clarify the definition of mnemonic as a mental device that aids memory that can include visual and/or auditory information.

Upon meeting someone for the first time, we tend to rely on visual appearance when making a first impression. Visual cues may help in the formation of an image-based mnemonic. Upon hearing someone's name, you might note its acoustic properties and begin thinking of similar-sounding information, such as rhymes.

Tell students that they will work in small groups and generate name mnemonics for every person in their group. Give them an example using your own name.

Instructions:

Divide students into small groups and create name mnemonics for each person in the group, first *and* last names. (You might do this by having students "count off," to avoid friends sitting together in class.)
Emphasize that each person is to *remember only* her or his *own* name mnemonic.
Emphasize that "anything goes" and the more bizarre and creative, the better.
When they are finished, have students return to their seats, and arrange chairs (if possible) into a circle.
Next, inform students that they will have to each present their name and mnemonic to the class, and everyone should do their best to try to remember the names because 3 people will be chosen to recall all of the names.
The students should then, individually, go to the chalkboard, *write* their names, *say* their mnemonics, *erase* their names, and sit down.
Ask for volunteers (so as not to really put anyone on the spot) to recall all of the names. Usually, students get between 85–100% of the names correct! It is quite a feat of memory.
After about 2–3 volunteers, you should try to name everyone (usually you'll be pressured to do this

by students anyway).

Ask them again, “Do you think you could have named everyone in here without the mnemonics?” Usually, the class states a resounding “No.”

This leads to a discussion about testable hypotheses, and one may choose to further the discussion during a different class period on research methods. Highlights of a research methods emphasis include confounding variables (e.g., knowing others in the class beforehand, practice effects during recall) and experimental design (e.g., testing the hypothesis of use of mnemonics vs. no mnemonics).

Smith, S. M. (1985). A method for teaching name mnemonics. *Teaching of Psychology, 12,* 156–158.

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Text p. 35 Module 2.1 The Five Characteristics of Quality Research
Activity: Small Samples

Objective: To discover whether small samples can really be representative
Materials: A coin, copies of the chart in the **handout master called Small Samples**
Procedure: Sometimes students have a hard time believing that 1,000 people or so can represent the entire population of the United States. This activity will help them see that small samples can be representative. Divide students into small groups and instruct them as follows:

Point out to students that, as *n* gets bigger, the more balanced the percentage of heads and tails becomes. However, they should notice too that *n*=20 isn’t much better than *n*=15. And it took a lot longer to collect 5 samples of 20 coin tosses each. In other words, there wasn’t much gain in representativeness for the extra cost in time and energy. So, small samples can be representative, and increasing the size of a sample doesn’t always pay off when costs are balanced against benefits.

Handout Master

Small Samples

You probably know that when you flip a coin, the chance of getting a head or a tail is 50%. But this probability is based on an infinite number of coin tosses. But how well does tossing the coin twice represent the whole population of tosses, or the infinite number of tosses? If a sample of 2 tosses, or n=2 as a statistician would express it, doesn’t represent the population, what about a sample of 5 or 10 or 15 or 20? To answer these questions, you have to take repeated samples of the same size. Toss a coin twice (n=2), and then write the number of heads and tails in the column labeled #1. Repeat the process four more times, recording your results the second time under #2, the third time under #3 and so on until you have a total of five samples, each of which consists of two coin tosses. When the n=2 row is completely filled in, calculate the overall percentage of heads and tails. Now use the same process to collect data on samples of n=5, n=10, n=15, and n=20.

Sample size	Toss #1		Toss #2		Toss #3		Toss #4		Toss #5		Overall %	
	H	T	H	T	H	T	H	T	H	T	H	T

n=2												
n=5												
n=10												
n=15												
n=20												

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Text p. 38 Module 2.1 The Five Characteristics of Quality Scientific Research
ACTIVITY: **Experiment Design to Test Common-Sense Statements**
In this activity, students take common-sense statements and design a study that would test them empirically.

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Text p. 38 Module 2.1 The Five Characteristics of Quality Scientific Research
ASSIGNMENT: **Journal Browsing**
This assignment, which may be completed either individually or in groups, asks students to go to the library and browse recent issues of abnormal psychology journals. They can then present an article of interest to the class, summarizing its purpose and its main findings.

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Text p. 39 Module 2.1 Subjective Thinking: Anecdotes, Authority, and Common Sense
JIGSAW: **Research and the Tabloids**
This exercise applies critical thinking to research claims in the tabloids.

Purpose: Students think critically about research claims in the tabloids.
Learning Structure: Jigsaw
Time: 20 minutes
Class Size: Most appropriate for small classes

Description: Students are instructed to bring in a research claim from a tabloid magazine or newspaper. Tabloids often have wild headlines, such as “Winos live longer,” or “Dogs and cats have exciting dreams.” Teams should work together to design a hypothetical experiment to test these research claims. If scientists wanted to test the claim that winos live longer, how could they do it? Students should write a description of their experiment and identify all the major components (hypothesis, independent variable, dependent variable).

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Text p. 39 Module 2.1 Subjective Thinking: Anecdotes, Authority, and Common Sense
Activity: Estimating the Frequencies of Our Own and Others' Behaviors

To demonstrate availability-related biases in estimating frequency, you can use this demonstration, which is an adaptation of a paradigm used in a study by Messick et al. (1985) titled "Why We Are Fairer Than Others." Ask students to take out a piece of paper and say: "On this sheet of paper, please write as many things that you can think of that you do, or that other people do, that you would describe as *inconsiderate.* If you think that you do these things more often than others, begin the sentence with "I." If you think that others do these things more often than you do, then start the sentence with "They." You will be given 3 minutes for this task."

After 3 minutes, ask them to turn the paper over and say: "On this side, please write down as many things that you can think of that you do, or that other people do, that you would describe as *considerate*. If you think that you do these things more often than others, begin the sentence with "I." If you think that others do these things more often than you do, then start the sentence with "They." You will be given 3 minutes for this task."

Students should tend to associate others with inconsiderate behaviors and themselves with considerate behaviors, something Messick and colleagues call the "differential slope model." Also, students may tend to use frequency modifier words such as *sometimes* with respect to their own inconsiderate behaviors, and *always* when referring to others' inconsiderate behaviors. Discuss why others' negative behaviors are more memorable and therefore more available. Conversely, students may consider why their own considerate behaviors are more memorable. They may also be asked to consider the implications of this difference in availability for over (and under) estimating good and bad behaviors.

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Text p. 39 Module 2.1 Subjective Thinking: Anecdotes, Authority, and Common Sense
Activity: Can Science Answer This Question?

Students are asked to identify whether specific questions can be addressed using the methods of science. The student handout is included as the **handout master Can Science Answer This Question? .** Suggested answers and explanations are listed below.

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.

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).

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.

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.

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.

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.

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" in the 1990s might not be moral in 2020, and vice versa.

No. The subjects would be very uncooperative!

Handout Master

Can Science Answer This Question?

Psychology is an empirical science; that is, its knowledge is obtained through observation, experimentation, and measurement. Some questions cannot be answered empirically and are, therefore, outside the realm of science.

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.

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

Is abortion on demand bad for society?

Do people talk more after they have eaten than they do when they are hungry?

Does jogging lead to a positive mental attitude?

Are the incomes of doctors related to the grades they make in medical school?

Which emotion is stronger, love or anger?

Are breast-fed babies more alert than bottle-fed babies?

Will people be more moral in the year 2020 than they are now?

Are people who commit suicide sorry after they have done it?

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Text p. 40 Module 2.1 Summary

MYPSYCHLAB: **Study Plan for Module 2.1**

Are students reading and understanding the material? Assign MyPsychLab study plans to encourage reading and to better assess class progress. Pre-Test is automatically graded and leads to personalized study plan for students. Post-Test provides additional practice and reinforcement.

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Text p. 43 Module 2.2 Descriptive Research

Assignment: 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.

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Text p. 43 Module 2.2 Descriptive Research

ACTIVITY: **Naturalistic Observation**

In this assignment, students conduct a naturalistic observation on personal space.

Objective: To collect data on spatial relationships.

Materials: None

Procedure: Assign students to small groups of four or five individuals. Ask each to collect data on personal space in two distinct social situations, perhaps the student union building or other public areas on campus and a situation such as a party, a bar, or another area where individuals are talking. Ask the students to estimate the distance that individuals stand apart when they talk in this public area, noting any differences between same sex and opposite sex individuals. Encourage students to be creative in their data collection; for example, they could approach the participants with a yardstick, or they could count the number of tiles on the floor. Students will come up with their own ideas on the best methods of data collection. When students bring their data to class, summarize each group's findings in terms of the mean distances individuals stand apart while talking and put the results on the overhead or chalkboard. Break out the data by sex and situation. Discuss any problems the students encountered with this type of data collection.

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Text p. 43 Module 2.2 Correlational Research

ACTIVITY: **Correlating Shoe Size and Height**

Students collect and graph height and shoe size data for members of the class, then use these data to determine whether the two variables are correlated.

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: 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 hypotheses 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 know 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 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. Once 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.

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Text p. 44 Module 2.2 Correlational Research

Activity: **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 called **Critical Thinking Exercise: Understanding Correlations.** Suggested answers are provided below; however, there are other reasonable explanations.

Positive. Mutual influence. Similar life experiences.

Negative. Orphanage environment has an adverse effect on cognitive development. Intelligent children are more likely to be adopted.

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.

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.

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.

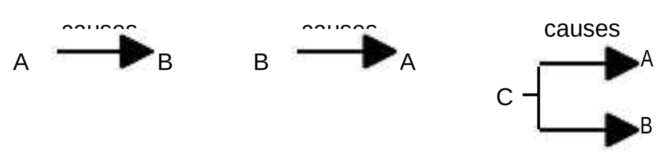
Positive. Both variables are related to socioeconomic factors; children from affluent homes have both intellectual and physical advantages over children from substandard home environments. Age is the third variable that accounts for scores on both variables; older children have bigger vocabularies and are also stronger and better coordinated.

Handout Master

Critical Thinking Exercise: 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 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.

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:

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:

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:

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:

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:

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:

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Text p. 44 Module 2.2 Correlational Research
Demonstration: The Direction and Strength of Correlations

This memorable visual demonstration shows incremental changes in scatterplots associated with incremental changes in the strength and direction of correlations. The demonstration is simple, and there is not much to ask in relation to it, but it does allow students to control the size of the correlation (numerically) and thus produce the changes in the scatterplot.

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Text p. 44 Module 2.2 Correlational Research
QUIZ/HANDOUT: **Quiz on Correlation**
Students identify positive and negative correlations.

Purpose: Students identify positive and negative correlation. Instructors assess how well students understand the difference between positive and negative correlation.
Learning Structure: Visible Quiz
Time: 5-10 minutes
Class Size: Appropriate for most class sizes
Description: Using the visible quiz technique, instructors ask students to write the word *positive correlation* one side of a piece of paper, and *negative correlation* on the other. The instructor reads a list of prepared examples of correlations, such as the following:

The more I eat, the more I weigh.
The more time I spend at the mall, the less money I have.
The more I brush my teeth, the fewer cavities I have.
The less I study, the poorer my grades.

After the instructor reads an item, students indicate by holding up their paper whether it's an example of positive or negative correlation. This activity can reinforce lecture material on correlation but also allows instructors to assess how well students understand correlation.

For more on Interactive Learning, visit our online guide to using Interactive Learning in the classroom.

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Text pp. 44 - 46 Module 2.2 Correlational Research and Module 2.2 Experimental Research
ACTIVITY: **Correlational and Experimental Research**
This activity asks students to consider how to study the same topic using a correlational design and an experimental design.

Many students have difficulty understanding the difference between correlational research and experimental research. It might be useful to walk the class through an example where both kinds of research are illustrated with the same variables. Two examples that could be used this way are the relationship between violent television viewing and aggression, and the relationship between similarity and liking. In both examples either variable could plausibly be caused by the other (or by some third factor); so the step up from correlational to experimental research, where causality can be determined, can be seen as useful. Spend some time discussing how psychologists must be ingenious to turn concepts such as "liking" into measurable variables (this will help students appreciate the scientific process). As examples, you can present actual studies that have been done in these two areas. Byrne (1971) discusses extensive research on the influence of similarity on attraction, and Liebert and Sprafkin (1988) discuss the effects of television on children.

Byrne, D. (1971). *The attraction paradigm.* New York: Academic Press.
Liebert, R., & Sprafkin, J. (1988). *The early window: Effects of television on children and youth*. New York: Pergamon Press.

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Text p. 45 Module 2.2 Correlational Research
ACTIVITY: **Work the Scientific Literacy Model**
For further practice have students apply the four questions from the scientific literacy model (page 5 of the textbook) to "Myths in Mind: Beware of Illusory Correlations." Sample response also provided in the Instructor's Manual and Study Guide.

Sample response:

What do we know about correlational research concepts and illusory correlations?

Terms and definitions are below as an example. Students should put these into their own words and talk about how they relate to the Myths in Mind section.

Correlational research (p. 44) involves measuring the degree of association between two or more variables.

Correlation does not equal causation, correlations show only how variables are related.

There is a possibility that a third, unmeasured variable is actually responsible for a well-established correlation between the two variables.

Illusory correlations are relationships that really exist only in the mind, rather than in reality.

How can science explain illusory correlations?

Many individuals see relationships between variables that actually do not exist. Misperceived correlations include crime increases when there is a full moon, opposites attract, and that gamblers and athletes can get on a "hot streak". However, sound research has failed to show that full moons are related to bizarre or violent behavior. In addition, people are more likely to be attracted to similar others, and there is no such thing as a hot streak in competitive sports or gambling.

Can we critically evaluate illusory correlations?

Such illusory correlations exist because they easily come to mind. This is due to such factors as the frequency with which they are repeated as well as the fact that they are more memorable than the norm (e.g., evenly matched couples). However, examples that come easily to mind are not always correct.

Why is this relevant?

Illusory correlations can be harmful, as is often the case with stereotypes.

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Text p. 45 Module 2.2 Experimental Research
ACTIVITY: **Testing Random Assignment**
This hands-on activity teaches students about 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 on the card. 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.

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Text p. 45 Module 2.2 Experimental Research
Activity: Experimental Design: Developing a Testable Hypothesis

The overarching goals of the following exercise are to demonstrate how psychology and the scientific method can be used to address issues that interest your students, to teach them how the concepts they are learning influence experimental design, and to impress on them an appreciation for the challenges faced by experimental psychologists. Lead your class through the process of designing an experiment. Start with a hypothesis generated through brainstorming by the class. Allowing your students to provide the hypothesis ensures that it will interest them and that they will stay engaged. Students may start with topics such as alien abduction, crop circles, and the Loch Ness monster. Welcome this, as it gives you a terrific opportunity to talk about alternative explanations, existence proofs, and the fact that some topics, such as the proof of the existence of God, remain firmly outside the boundaries of science. The scientific method is not a panacea; it is a highly structured method for testing measurable factors and relationships. After your class has agreed on an issue to test, lead them toward a consensus and a testable hypothesis about the issue. Once your class has clearly defined a hypothesis, lead them through a discussion of possible alternative explanations. Challenge their hypothesis and their beliefs. Are there other possible explanations that are simpler and more likely? What assumptions and possible biases underlie their hypothesis? How would the hypothesis (and their assumptions and biases) generated by your class be different from explanations put forward by people from different cultures and different times? You might want to mention that spirit possession was a widely held explanation for mental illness until relatively recently. After listing a number of possible alternative explanations, allow your class to suggest a very basic methodology for testing the hypothesis and eliminating the alternative explanations. You might want to give them a head start by suggesting the kind of data that they would need to collect to measure the variables of interest. Depending on the hypothesis chosen and the sophistication of your class, outlining a reasonable experiment may be a difficult process. If the class begins to show signs of overload, you can quickly switch gears and use the exercise to demonstrate the difficulty in designing and executing well-controlled experiments.

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Text p. 46 Module 2.2 Experimental Research
Demonstration: Equating Groups on Multiple Variables Using Randomization

An interesting demonstration of randomization is described in an article by Enders, Laurenceau, and Stuetzle, titled “Teaching Random Assignment: A Classroom Demonstration Using a Deck of Playing Cards.” The article is published in *Teaching of Psychology*, (2006), volume 33, No. 4, pages 239–242. The authors describe a simple strategy in which students “randomly assign” cards to two groups. The two groups of card/subjects are then compared with respect to the frequency of specific characteristics such as the number of face cards, red cards, etc. This will help students see how random assignment helps equate groups on characteristics beyond those the experimenter has in mind. Two packs of cards may also be used.

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Text p. 46 Module 2.2 Experimental Research **Activity: Identifying the Parts of an Experiment**

To help students learn to identify the components of an experiment, the master Identifying the Parts of an Experiment presents the abstract from a recent article from the *Journal of the American Medical Association* on an issue of some interest to many: Smoking cessation. The abstract is dense, but the independent and dependent variables are clear, along with the treatment and placebo. It is interesting to note that side effects are also reported within the placebo group. Students may suggest possible explanations for this “nocebo” effect.

Handout Master

Identifying the Parts of an Experiment

Please read the following abstract (i.e., summary) of a recent article by Jorenby and colleagues that appeared in the *Journal of the American Medical Association* (July 2006). Identify the following:

- Independent variable; describe the treatment in some detail.
- Dependent variable; describe this outcome variable in detail.
- Method of selecting participants.
- Method of assigning participants to groups.
- Hypothesis/Research question.
- Outcome (i.e., results) of the study.

You may also want to consider the following question: Why would members of the control group also experience "side effects"?

Efficacy of varenicline, an alpha4beta2 nicotinic acetylcholine receptor partial agonist vs. placebo or sustained-release bupropion for smoking cessation: a randomized controlled trial.

CONTEXT: Varenicline, a partial agonist at the alpha4beta2 nicotinic acetylcholine receptor, has the potential to aid smoking cessation by relieving nicotine withdrawal symptoms and reducing the rewarding properties of nicotine.

OBJECTIVE: To determine the efficacy and safety of varenicline for smoking cessation compared with placebo or sustained-release bupropion (bupropion SR).

DESIGN, SETTING, AND PARTICIPANTS: A randomized, double-blind, placebo-controlled trial conducted between June 2003 and March 2005 at 14 research centers with a 12-week treatment period and follow-up of smoking status to week 52. Of 1,413 adult smokers who volunteered for the study, 1,027 were enrolled; 65% of randomized participants completed the study.

INTERVENTION: Varenicline titrated to 1 mg twice daily (n = 344) or bupropion SR titrated to 150 mg twice daily (n = 342) or placebo (n = 341) for 12 weeks, plus weekly brief smoking cessation counseling.

MAIN OUTCOME MEASURES: Continuous abstinence from smoking during the last 4 weeks of treatment (weeks 9–12; primary end point) and through the follow-up period (weeks 9–24 and 9–52).

RESULTS: During the last 4 weeks of treatment (weeks 9–12), 43.9% of participants in the varenicline group were continuously abstinent from smoking compared with 17.6% in the placebo group (odds ratio [OR], 3.85; 95% confidence interval [CI], 2.69–5.50; P<.001) and 29.8% in the bupropion SR group (OR, 1.90; 95% CI, 1.38–2.62; P<.001). For weeks 9 through 24, 29.7% of participants in the varenicline group were continuously abstinent compared with 13.2% in the placebo group (OR, 2.83; 95% CI, 1.91-4.19; P<.001) and 20.2% in the bupropion group (OR, 1.69; 95% CI, 1.19–2.42; P = .003). For weeks 9 through 52, 23% of participants in the varenicline group were continuously abstinent compared with 10.3% in the placebo group (OR, 2.66; 95% CI, 1.72–4.11; P<.001) and 14.6% in the bupropion SR group (OR, 1.77; 95% CI, 1.19–2.63; P = .004).

Treatment was discontinued due to adverse events by 10.5% of participants in the varenicline group, 12.6% in the bupropion SR group, and 7.3% in the placebo group. The most common adverse event with varenicline was nausea, which occurred in 101 participants (29.4%).

CONCLUSIONS: Varenicline is an efficacious, safe, and well-tolerated smoking cessation pharmacotherapy. Varenicline's short-term and long-term efficacy exceeded that of both placebo and bupropion.

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Text p. 46 Module 2.2 Experimental Research
Activity: Using Memory to Demonstrate Methodology

This demonstration introduces the concept of the experimental method; however, it is equally applicable to the material in the memory chapter. Students are given the question "Can we improve memory by using a mnemonic technique?" and are asked to design an experiment to test the hypothesis. The experiment is then conducted using procedures summarized below. Through this procedure, students are guided through a typical psychological experiment and are introduced to the concepts of independent variable, dependent variable, experimental and control groups, and control procedures.

Prepare a mnemonic technique and write it on small slips of paper to hand to some of the students (half of the class). Construct a list of common words to use in conjunction with the mnemonic. Here is one of many mnemonic techniques:

PRESIDENTIAL

Word List: Pet, Road, Eagle, Screen, Ink, Dog, Envelope, Number, Target, Income, Alley, Library

Begin a discussion of the experimental method by asking for definitions of a hypothesis. After discussing the students' definitions tell them that they are going to conduct an experiment in class and provide them with the question above as the hypothesis. After defining mnemonic techniques, inform the class that you have a mnemonic technique but need to know how to proceed from this point. Students are asked for input as to how to test the hypothesis. Usually someone proposes that the class be divided into two groups: one that receives the mnemonic and one that does not. Ask how the students should be assigned to each group. This leads us to a discussion of random assignment.

The experiment begins by passing out the slips of paper with the mnemonic to the "experimental" group. All students are then given the following instructions: "I am going to read a list of words; when I'm finished I want you to recall as many words as you can IN THE SAME ORDER AS THEY WERE READ." Tell the experimental group how to use the mnemonic: "The letters of the word correspond to the first letter of each word in the list, so you can use the word to help you remember the order of the words in the list."

Read the list of words, pausing about 4 seconds between words. Then tell the students to write down as many words as they can remember in the same sequence as they were read. Allow about three minutes of recall time, then ask the students to correct their own paper and tabulate the results on the board. This demonstration typically yields a large difference between the two groups. If desired, you can initiate a discussion of statistical inference and perhaps conduct some preliminary analyses. Discuss how the results pertain to the original hypothesis.

Adapted from Davis, S. F., & Palladino, J. J. (1994) *Interactions: A newsletter to accompany*

Psychology, *1(Win)*, 1.

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Text p. 46 Module 2.2 Experimental Research
Activity: Give the Doctor Some Advice

This exercise describes research on the effects of drinking and driving. However, this study is flawed and students are asked to suggest ways to correct the errors. Copy the handout master **Give the Doctor Some Advice** and distribute to students as a basis for this exercise.

Suggested answers:

e. No, because there were too many confounding variables in his experiment, including both a and b

Possible confounding variables:
The vodka and the placebo should be mixed in equal amounts of orange juice.
Subjects should be chosen randomly and also assigned randomly to the different groups. (The same amount of alcohol affects males and females differently.)
The researcher should not select friends, colleagues, or his own students as the subjects for this research, or any research, because of possible experimenter expectancy and demand characteristics.
The subjects should participate at the same time of day since their last meal can determine how potent the effects of alcohol can be.

Informed consent should be obtained before the research, not after.
Given these many possible confounding variables, Dr. Moesteller should be more cautious in his conclusions.

Handout Master

Give the Doctor Some Advice

Dr. Moesteller has long been interested in the effects of alcohol on human behavior. His latest experiment involved giving college students one of three kinds of drinks:

3 oz. of 100 proof vodka mixed with a standard size glass of orange juice,
2 oz. of 100 proof vodka mixed with a small glass of orange juice, or
3 oz. of a nonalcoholic but vodka-flavored substance mixed with a standard size glass of orange juice.

Dr. Moesteller recruited some of his subjects from the school's track team, which was easy because he is the assistant coach. He recruited the rest of his subjects from his introductory psychology class. Dr. Moesteller assigned the women on the track team to the 2 oz. vodka group, the men from his class to the 3 oz. vodka group, and the women from his class to the nonalcoholic group.

The women on the track team participated right after they finished practicing, and students from his class participated at various times during the day. After each group had a chance to drink the beverage, he had them sit in an automobile simulator where their task was to step on the brake every time they saw a red light.

Much to his surprise, the 2 oz. group showed slower reaction times to the red light than the 3 oz. group. The nonalcoholic group was the quickest to react. As soon as the experiment was over, he explained to the subjects the true purpose of the experiment and had them sign an informed consent form. From his analysis of the results, Dr. Moesteller concluded that drinking alcoholic beverages can slow reaction time for braking in college students who drive after drinking.

Based on his experiment, was Dr. Moesteller's conclusion correct?

No, because he did not randomly select his subjects.
No, because he knew some of his subjects better than others.
Yes, because subjects in both experimental groups had slower reaction times than the control group.
Yes, because his results agree with what we all know from our experience with those who drink and drive.
No, because there were too many confounding variables in his experiment, including both a and b.

On the other side of this page, give Dr. Moesteller some advice on how he might improve his research on drinking.

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Text p. 47 Module 2.2 Experimental Research
Activity: Which Method Would You Use?

This activity is a good review of Module 2.2. The following examples can be used to generate a class discussion on the research methods used by psychologists. Write the 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.

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.

Determining whether a person is introverted or extroverted.
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.

Determining whether 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.

Determining whether 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.

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, and the investigator will need to be careful to prevent "guinea-pig" reaction.

Determining the behavior of subjects 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.

Determining why a housewife 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.

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Text p. 47 Module 2.2 Experimental Research
Activity: Name That Research Method

In this exercise, students are asked to match brief descriptions of research with the name of the method being used. It reviews Module 2.2. Table 2.2 in the textbook (p. 46) is helpful in comparing research designs. Copy the handout master Name That Research Method and distribute to students as a basis for this exercise.

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

Handout Master

Name That Research Method

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

case history
naturalistic observation
laboratory observation

survey
psychological tests
experiment

Frank is a full 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.

Ben is counseling with Fennimore Jones in a small room in the neuropsychiatric hospital. Ben is a graduate student in clinical psychology and Fennimore is his client. Fennimore was admitted to the neuropsychiatric hospital when he came to the student health clinic complaining that he hears voices shouting obscenities at him, and confiding that he thinks he is going through a spontaneous sex change. After each session with Fennimore, Ben writes a report describing Fennimore's verbal and nonverbal behavior and his interpretations of the behavior.

Carl 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.

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.

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.

Ed is an undergraduate psychology major. For his senior thesis he is investigating the nature of the audience for pornography. This afternoon he is sitting in his car across the street from one of the pornographic bookstores in the area. He is taking notes on the sex, approximate age, and ethnicity of the patrons as they enter and leave the store.

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Text p. 47 Module 2.2 Summary

MYPSYCHLAB: **Study Plan for Module 2.2**

Pre-Test is automatically graded and lead to a personalized study plan, arranging content from less complex thinking (remembering and understanding) to more complex critical thinking (applying and analyzing). Post-Test provides students additional practice and reinforcement.

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Text p. 51 Module 2.3 Promoting the Welfare of Research Participants

ACTIVITY/HANDOUT: **Judging the Ethics of Researchers**

This handout lists potential experiments and asks students to consider how ethical they are.

Homosexual attitudes

Men are recruited to participate in an experiment on sexual attitudes, although they are not told that it is actually a study of attitudes toward homosexuality. Participants are led to believe that a "psychogalvanometer" used in the experiment is capable of detecting sexual arousal. They are also told that if the galvanometer registers arousal when an individual looks at slides of nude males, the individual is probably a latent homosexual. The galvanometer is rigged so that all participants are led to believe they are latent homosexuals. Following the experiment, the researcher informs the participants that the galvanometer was rigged, and he gives detailed information about the study and its true purpose.

very ethical ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ very unethical

Student cheating

Without informing his students, a professor uses one of his classes for a research study of cheating behavior. True-false exams are given at various points in the semester. After each test the exams are collected, copied, and then returned to the students, who are told they will score their own tests. A comparison of student graded exams with ungraded copies will reveal instances where students cheated by changing test answers. At the end of the semester, the professor tells his class about the research project in which they had participated unknowingly.

very ethical ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ very unethical

Racial attitude change

The purpose of the experiment is to compare the effects of different methods of reducing racial prejudice. Students with strong racial prejudice are recruited for the experiment but are not told the true purpose of the study. Instead, they are led to believe that the experiment focuses on a topic unrelated to prejudice. After the experiment is completed, participants are informed of the true purpose of the experiment and its effect on their personal beliefs.

very ethical ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ very unethical

Effects of combat stress

Inexperienced soldiers, unaware that they are actually involved in a research study of the effects of combat stress, are disoriented, isolated, given false instructions, and led to believe that they have caused artillery to fire on their own troops during final training maneuvers. Since actual ammunition is used in these maneuvers, the soldiers are led to think that real casualties have occurred and that they are responsible. When the soldiers return to their base of operations, they are told that the incident was staged as part of a research study of combat stress. The importance of the study and the details of the research are explained to the men.

very ethical ___ ___ ___ ___ ___ ___ ___ ___ ___ ___ very unethical

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Text p. 53 Module 2.3 Ethical Collection, Storage, and Reporting of Data
Activity: What Do Journals Look Like?

Scientific journals and peer review are essential to the field, but even after they are fully described, may seem remote and abstract to students (especially when they have just entered college). Bring relatively recent journal issues to the class, pass them around and ask students to examine the tables of contents for articles that address issues that seem personally interesting to them; ask them to read the titles out loud to the class. Journals from the Association for Psychological Science are excellent for this exercise because they address diverse issues in psychology. The exercise is useful for demonstrating that psychological journals present findings that are of wide relevance and interest.

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Text p. 53 Module 2.3
MYPSYCHLAB: **Study Plan for Module 2.3**
The MyPsychLab Study Plan includes formative assessment quizzes for all major sections, to help ensure that students are getting the support they need without adding additional time and grading.

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Text p. 57 Module 2.4 Descriptive Statistics
ACTIVITY: **Mean, Median, and Mode**
Students gain a deeper understanding of mean, median, and mode by answering a question and lining up according to the answer.

Purpose: To illustrate the concepts of mean, median, and mode

Learning Structure: Line-Ups

Time: 20 minutes

Class Size: Appropriate for smaller class sizes

Description: The line-ups technique can be used to give students a kinesthetic and visual sense of descriptive statistics. The instructor asks students a question with an answer that can be ordered numerically. For example, the instructor could use age or height. Students line themselves up according to their answers. The instructor can then use the data to calculate the mean (average score), and students can number off themselves in order to locate the median (middle score). A variation of this exercise is to place numbered cards along the line. For example, with age, the cards could be numbered from 17 to 25. Students should stand on their age. It will be easy to see which age occurs most frequently (mode).

You can also use this exercise to illustrate the importance of having a large sample. You can start by selecting five students to line up based on height, and then calculate the mean. Then select a different five students and calculate a second mean. After you've done this several times, start adding five students at a time and continue to calculate the mean. Continue to add until the whole class in on the line. You may also be able to graph a normal curve based on student data.

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Text p. 59 Module 2.4 Hypothesis Testing: Evaluating the Outcome of the Study
Activity: Wonder Horse Dials 911 to Save Boy's Life

Jane Halonen suggests a fun class exercise that tests students' understanding of experimental methodology principles. Once 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.

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Text p. 59 Module 2.4 Hypothesis Testing: Evaluating the Outcome of the Study
Activity: 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 critiqued 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.

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Text p. 60 Module 2.4 Summary
MYPSYCHLAB: **Study Plan for Module 2.4**

The MyPsychLab Study Plan includes formative assessment quizzes for all major sections, to help ensure that students are getting the support they need without adding additional time and grading.

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ANSWERS TO CHAPTER 2 QUIZ

2.1 A
2.2 B
2.3 D
2.4 D
2.5 B
2.6 D
2.7 C
2.8 A
2.9 C
2.10 B
2.11 A
2.12 C
2.13 B
2.14 B
2.15 D

▼ FORTY STUDIES THAT CHANGED PSYCHOLOGY

Forty Studies that Changed Psychology: Explorations into the History of Psychological Research, 7/e (0205918395)
By Roger Hock

Available for ordering with Krause/Corts *Psychological Science: Modeling Scientific Literacy, Second Edition*
This unique book closes the gap between psychology textbooks and the research that made them possible by offering a firsthand glimpse into 40 of the most famous studies in the history of the field, and subsequent studies that expanded upon each study's influence. Readers are able to grasp the process and excitement of scientific discovery as they experience an insider's look at the studies that continue today to be cited most frequently, stirred up the most controversy when they were first published, sparked the most subsequent related research, opened new fields of psychological exploration, and changed most dramatically our knowledge of human behavior.

Studies examined in Intelligence, Cognition, and Memory:

Thanks for the Memories!

Loftus, E. F. (1975). Leading questions and the eyewitness report. *Cognitive Psychology, 7,* 560–572.

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WEB RESOURCES

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Research Design

Simeon's Cave of Magic and the Confirmation Bias:
This site presents an amusing and effective example of the confirmation bias, briefly mentioned again in this chapter. In this magic trick, participants pick a card from six, are asked to memorize it and then are shown a second array with their card magically "deleted." The trick works because of confirmation bias; in fact, all of the cards are different, but participants notice only that the card they selected has been deleted. Ask students to figure out how the trick is done.

Discovering Psychology Episode on Decision Making:
The first 10 minutes of this video features an interview Nobel Prize winner Daniel Kahneman and the late Amos Tversky as they discuss the availability and representativeness heuristics.

Stanford Encyclopedia of Philosophy:
Discussion of how the experimental demand characteristics on the performance of the human subjects can affect the actual outcome of a study.

Correlation Is Not Causation:
Recently, researchers reported that drinking sodas, even diet ones, is related to heart disease and diabetes; some possibilities are suggested in the news story from MSNBC. Students may write a brief paper generating additional possible causal mechanisms underlying this surprising correlation and describing how this association could be investigated experimentally, including the independent and dependent variables, and what difficulties they might encounter creating a double-blind study and ensuring that the experiment is consistent with ethical guidelines.

Ethics

APA Code of Ethics

American Psychological Association's Ethical Principles of Psychologists and Code of Conduct. Your students may be required to participate in experiments as part of their introductory course. Introduce them to this website either at the start of the semester (to allay their fears about participating in studies) or at the end (as a "wrap-up" paper comparing their research experiences with the ethical guidelines stated by APA).

Ethics and Animal Experimentation:
Read arguments for the importance of animal research for promoting the understanding and welfare of human beings. The Committee on Animal Research and Ethics (CARE) has produced two videos on the importance of animal research. The first describes research in sensation and perception; the second describes research on pharmacology. Descriptions of the videos may be found at may be ordered through the APA order department:

A History of Ethical Abuses:
This interview is a follow-up to the description of the Tuskegee Study presented in the text. In the interview, scholar Harriet Washington is interviewed about her book *Medical Apartheid: The Dark History of Medical Experimentation on Black Americans from Colonial Times to the Present*. The book examines the unethical treatment and abuses of African Americans by the medical establishment. The interview is available in transcript, audio, and video versions.

Research/Statistics

Rice Virtual Lab in Statistics:

Includes links to an online statistics textbook, simulations and demonstrations, case studies, and basic statistical analysis tools.

VassarStats
Richard Lowry from Vassar College maintains this excellent site for statistical calculations.

The Practical Significance of Statistical Significance:
This recent article from the *New York Times* (note: subscription required) describes the differences in overall happiness between men and women. But the critique by a University of Pennsylvania professor regarding the true size and meaning of the effects is well taken.

Illusion and Statistical Analysis
Psychological scientist Thomas Gilovich is interviewed during the first 10 minutes of this NPR show. The topic is the illusory "hot hand" in basketball, that is, the much-held belief in "streak shooting." This illusion illustrates well the importance of statistical analyses.

Oscar the "Deathcat"
The story was also covered in the news; a brief video clip is available.

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MYPSYCHLAB MULTIMEDIA RESOURCES

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On-line Resources: MyPsychLab

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 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.

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

Steven Demorest and Steven Morrison: Music Is/Is Not A Universal Language (APS Player)
What Do You Think about Psychological Research?
Women, Health and Stress: Florence Denmark
Before Informed Consent: Robert Guthrie
The Big Picture: How to Answer Psychological Questions
The Basics: Scientific Research Methods
Special Topics: Ethics and Psychological Research
Thinking Like a Psychologist: Thinking Critically
In the Real World: Resolving Conflict
What's In It For Me? How am I being Influenced?

REVEL MULTIMEDIA RESOURCES

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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: Reading and Evaluating Scientific Research		
2.1: Principles of Scientific Research	Journal Prompt	Qualities of Good Measurement
	Drag & Drop	Table 2.1 Reliability and Validity
	Flashcards	Module 2.1 Key Term
	Section Quiz	2.1: Principles of Scientific Research (15 points)
2.2: Scientific Research Designs	Simulation	Exploring Correlations
	Journal Prompt	Correlations and Causation
	Video	Scientific Research Methods
	Drag and Drop	Table 2.3 Applying Your Knowledge of Research Terms to Understand Research Designs
	Flashcards	Module 2.2 Key Term
	Section Quiz	2.2: Scientific Research Designs (15 points)
2.3: Ethics in Psychological Research	Journal Prompt	Applying Research Ethics
	Tabs/Accordions	Table 2.4 Applying Research Ethics
	Flashcards	Module 2.3 Key Term
	Video	Ethics and Psychological Research
	Section Quiz	2.3: Ethics in Psychological Research (15 points)
2.4: A Statistical Primer	Fill in the blank	Figure 2.12 Applying Your Knowledge
	Journal Prompt	Understanding the Standard Deviation
	Simulation	Figure 2.14 Testing a Simple Hypothesis

	Flashcards	Module 2.4 Key Term
	Section Quiz	2.4: A Statistical Primer (15 points)
2.5: Scientific Literacy Challenge: Self- Reports	Journal Prompt	Scientific Literacy Challenge: Self-Reports
	MC Quiz	Scientific Literacy Challenge: Self-Reports Quiz
	Drag and Drop	Scientific Literacy Challenge: Self-Reports Matching Activity
	Shared Writing	Scientific Literacy Challenge: Self-Reports (20 points)
	Chapter Quiz	Chapter 2 Quiz: Reading and Evaluating Scientific Research (75 points)
	Writing Space	Research Methods (100 points)
	Writing Space	Ethics (100 points)
	Writing Space	Statistics (100 points)
	Writing Space	Marriage Statistics (100 points)

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LEARNING CATALYTICS

Learning Catalytics is a "bring your own device" student engagement, assessment, and classroom intelligence system. It allows instructors to engage students in class with real-time diagnostics. Students can use any modern web-enabled device (smartphone, tablet, or laptop) to access it.

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POWERPOINT SLIDES for Krause/Corts, *Psychological Science: Modeling Scientific Literacy, Second Edition*

THREE Distinct Sets of PowerPoint Slide Collections are available:

Interactive PowerPoint slides: These multimedia-enhanced slides bring the powerful content right into the classroom, drawing students into the lecture and providing wonderful interactive exercises, visuals and videos.

The Lecture: ADA Compliant PowerPoint slides (available for download at have your login ready). These slides provide a more traditional approach to presenting the material, with clear excerpts of the text material, and select figures and art from the textbook also included. *Meets current accessibility standards for students with disabilities.*

Photo, Art & Figure PowerPoint slides (available for download at These files contain all of the art and figures from the textbook, for instructors who wish to insert them into their own slide presentations.

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ACCESSING RESOURCES for Krause/Corts, *Psychological Science: Modeling Scientific Literacy, Second Edition*

For a list of all student resources available with ***Psychological Science*: *Modeling Scientific Literacy, Second Edition,*** go to ***enter*** the text ISBN (978-0-13-410158) and check out the "Everything That Goes with It" section under the book cover. Revel users, go to
For access to the instructor supplements for Krause/Corts, *Psychological Science*: *Modeling Scientific Literacy, Second Edition* simply go to and follow the directions to register (or log in if you already have a Pearson user name and password).

Once you have registered and your status as an instructor is verified, you will be e-mailed a login name and password. Use your login name and password to access the catalogue. Click on the "online catalogue" link, click on "psychology" followed by "introductory psychology" and then the Krause/Corts, ***Psychological Science*: *Modeling Scientific Literacy, Second Edition*** text. Under the description of each supplement is a link that allows you to download and save the supplement to your desktop.

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