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CORRECT ANSWERS ARE LOCATED IN THE 2ND HALF OF THIS DOC.

MULTIPLE CHOICE - Choose the one alternative that best completes the statement or answers the question.

1) _____ entails collecting observations, or data, from the real world and evaluating whether the data support our ideas or not.
   A) Speculation
   B) Biases
   C) Science
   D) Hypotheses

2) _____ is the view that using logic and reason is the way to under-stand how the world works.
   A) Creationism
   B) Skepticism
   C) Empiricism
   D) Rationalism

3) Identify a TRUE statement about human observation.
   A) Our brain perceives events as accurately as the best available digital video equipment.
   B) People tend to generalize from their observations and assume that what they witness in one situation applies to all similar situations.
   C) Generalizations based on our sensory experiences tend to be always correct.
   D) Different people's brains organize and interpret sensory experiences in the same way.

4) Which of the following sciences studies the world of things—the inanimate world of stars, light, waves, atoms, the Earth, compounds, and molecules?
   A) biological science
   B) social science
   C) physical science
   D) psychological science

5) Which of the following was NOT an issue with Dr. Andrew Wakefield's paper that claimed autism spectrum disorder was often caused by measles vaccines?
   A) He only tested a single vaccine and not its many variants.
   B) His sample size was only 12 children.
   C) Many scientists and medical panels could not confirm the results.
   D) An investigation concluded he had altered the results.

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6) _____ is a branch of physical science.
   A) Economics
   B) Psychology
   C) Geology
   D) Genetics

7) The _____ sciences study humans both as individuals and as groups.
   A) chemical
   B) biological
   C) physical
   D) social

8) Which of the following statements is TRUE of scientific thinking?
   A) It rules out the need for a set of procedures thought to be important for science.
   B) It involves the reasoning skills required to generate, test, and revise theories.
   C) It condones skepticism.
   D) It asserts the use of scientific authority.

9) Science is first an attiude that requires us to keep open eyes and
   A) practical thinking.
   B) intellectual honesty.
   C) questioning skepticism.
   D) questioning minds.

10) According to Carl Sagan, the scientific attitude balances _____ and openness.
   A) questioning authority
   B) intellectual honesty
   C) practical thinking
   D) skepticism

11) When the central tenet of knowing is not what people think and believe, but rather how nature behaves, then we must accept the data and follow them wherever they take us. This attitude is known as
   A) intellectual honesty.
   B) scientific thinking.
   C) open skepticism.
   D) cultural understanding.

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12) When can scientists help ensure accurate and honest presentation of results?
- A) when they protect their methods of inquiry from others
- B) when they announce their findings immediately after a study
- C) when they ignore the data that are contrary to their theory
- D) when they allow their work to be evaluated by other scientists

13) _____ is defined as the procedures, consisting of six basic processes, by which scientists conduct research.
- A) Rationalism
- B) Scientific thinking
- C) Scientific method
- D) Hypothesis

14) Which of the following is the first basic process of the scientific method?
- A) predict
- B) observe
- C) test
- D) interpret

15) The last process of the scientific method is to

- A) replicate.
- B) observe.
- C) test.
- D) predict.

16) Which of the following happens in the third stage of the scientific method?
- A) Scientists develop expectations about an observed phenomenon.
- B) Scientists test their hypotheses.
- C) Scientists use mathematical tech-niques to interpret results.
- D) Scientists communicate results.

17) In the _____ and _____ stages of the scientific method, researchers express their expectations as a theory.
- A) communication; testing
- B) prediction; interpretation
- C) observation; prediction
- D) communication; prediction

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18) In the fourth step of the scientific method, scientists use mathematical techniques to _____ the results and determine whether they are significant and whether they closely fit the prediction.
A) communicate
B) replicate
C) interpret
D) observe

19) A theory is defined as a
A) practice that appears to be and claims to be a science, even though it does not use the scientific method to come to conclusions.
B) set of experiments conducted to confirm the results of a scientific study.
C) specific, informed, and testable prediction of what kind of outcome should occur under a particular condition.
D) set of related assumptions from which testable predictions can be made.

20) _____ is the consistency of a measurement whereas _____ is the degree to which a test accurately measures what it purports to measure.
A) Reliability; validity
B) Validity; reliability
C) Replication; interpretation
D) Intepretation; replication

21) Which of the following is TRUE about theories?
A) Theories cannot explain facts.
B) Theories organize and explain what we have observed.
C) Theories prevent people from making observations.
D) Theories, in science, are nothing more than mere guesses.

22) Identify an accurate statement about scientific theories.
A) They are not facts.
B) They do not generate any expectations.
C) They are merely guesses and observations.
D) They should not be tied to real evidence.

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23) A _____ is a specific, informed, and testable prediction of what kind of outcome should occur under a particular condition.
A) theory
B) hypothesis
C) replication
D) variable

24) A study was conducted across many cities in the United States to determine the correlation between the consumption of soft drinks and the prevalence of obesity in children. The study was conducted among children from different schools over a period of one year. Multiple correlations were taken and studied, and the results were found to be the same. It was found that obesity is found more in children who regularly consume soft drinks than in children who do not. Which of the following is a characteristic of the result of this study?
A) reasonable
B) predictable
C) reliable
D) favorable

25) To _____ a hypothesis, scientists select one of a number of established research methods, along with the appropriate measurement techniques.

A) predict
B) observe
C) replicate
D) test

26) A study was conducted by a group of researchers in Asian cities to determine the driving abilities of people of different age groups. The study found that older adults are better drivers than young adults. Another group of researchers conducted the same study in North American cities to determine if they could duplicate the results of the first study. In this scenario, the scientific method followed by the second group of researchers can be termed as
A) interpretation.
B) prediction.
C) observation.
D) replication.

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27) _____ is defined as the degree to which a test accurately measures what it purports to measure, such as intelligence, and not something else, and the degree to which it predicts real-world outcomes.
A) Replicability
B) Acceptability
C) Validity
D) Reliability

28) John works as a junior scientist in Geocare Research Company, California. He develops a model of a fabric panel that can reduce the damage caused by hurricanes. He publishes his idea in a science journal. Which of the following stages of the scientific method is reflected in this scenario?
A) interpreting results
B) communicating results
C) testing hypotheses
D) developing expectations about an observed phenomenon

29) Replication of a study is important to
A) confirm the results of the study.
B) formulate the hypothesis of the study.
C) express the expectations of the study.
D) interpret the results of the study.

30) _____ refers to practices that appear to be and claim to be science, but in fact do not use the scientific method to come to their conclusions.
A) Antiscience
B) Pseudoscience
C) Bioscience
D) Ethnoscience

31) According to Derry (1999), which of the following is TRUE of pseudoscience practitioners?
A) They challenge or question their own assumptions.
B) They back up their claims with sound, experimental research data.
C) They allow their findings to be rigorously scrutinized.
D) They make no real advances in knowledge.

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32) Which of the following would be considered a pseudoscience?
A) anthropology
B) astrology
C) psychology
D) biology

33) Which of the following is TRUE of the differences between science and pseudoscience?
A) Science uses statistics to express research data, whereas pseudoscience does not.
B) The content area studied in science is narrow, whereas it is very vast in pseudoscience.
C) Science encourages open skepticism of its findings, whereas pseudoscience does not.
D) Science makes no real advances in knowledge, whereas pseudoscience does.

34) The design chosen for a given study depends on the
A) result of the research.
B) assumed answer.
C) question being asked.
D) subject area being studied.

35) A variable can be defined as
A) a specific, informed, and testable prediction of an outcome.
B) the repetition of a study to confirm results.
C) anything that changes, or differs, within or between individuals.
D) a related assumption from which testable predictions can be made.

36) Which of the following is TRUE about the principles of research design?
A) The design chosen for a given study depends on the answers provided by the population.
B) The way the different variables, used by researchers, influence each other is irrelevant to the research design.
C) The first step in obtaining a sample is for the researchers to decide the makeup of the entire group.
D) Research is almost always conducted on large populations and not on samples.

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37) Why do researchers draw on small subsets of each population to collect data?
A) because cause-and-effect relationships between variables cannot be demonstrated otherwise
B) because research studies are based on many-on-one relationships
C) because the researchers are not open to surprising and unexpected results
D) because most populations are too large to survey or interview directly

38) A subset of a population is called a
A) sample.
B) variable.
C) size.
D) set.

39) Sarah wants to conduct a study about differences in the levels of emotion of jealousy between men and women. She asks 400 male and female college graduates in the United States a series of questions about hypothetical scenarios of partner infidelity. What is Sarah's population?
A) all the men studying in the United States
B) the chosen female graduates
C) the chosen male and female college graduates
D) men and women in the United States

40) Sarah wants to conduct a study about differences in the levels of emotion of jealousy between men and women. She asks 400 male and female college graduates in the United States a series of questions about hypothetical scenarios of partner infidelity. What is Sarah's sample?
A) all the men studying in the United States
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C) the chosen male and female college graduates
D) men and women in the United States

41) Sarah wants to conduct a study about differences in the levels of emotion of jealousy between men and women. She asks 400 male and female college graduates in the United States a series of questions about hypothetical scenarios of partner infidelity. How can Sarah ensure that the results of her study are more accurate?
A) by ensuring that the sample accurately represents people of different ethnicities
B) by increasing the number of men in the sample
C) by increasing the number of women in the sample
D) by ensuring that a higher number of Asian Americans are included in the sample

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42) Which statement best describes the term descriptive designs?
- A) There are methods used to assign participants to different research conditions, so that all the participants have the same chance of being in any specific group.
- B) There are research designs that include independent and dependent variables and random assignment of participants to control and experimental groups or conditions.
- C) They are design studies in which a researcher defines a problem and variable of interest but makes no prediction and does not control or manipulate anything.
- D) These are studies that measure two or more variables and their relationship to one another; they are not designed to show causation.

43) In _____, a researcher makes no prediction and does not try to control any of the variables.
- A) representative samples
- B) experiment
- C) sampling
- D) descriptive designs

44) The basic question in a(n) _____ is, "What is variable X?"
- A) descriptive design
- B) random sampling
- C) experimental study
- D) correlational design

45) Which of the following statements is TRUE of a descriptive study?
- A) The researcher avoids patterns that might lead to predictions.
- B) The researcher makes a prediction and tries to control variables.
- C) It involves the testing of hypotheses.
- D) It usually occurs during the exploratory phase of research.

46) A(n) _____ can be defined as a study design in which a psychologist, often a therapist, observes one person over a long period of time.
- A) naturalistic observation
- B) case study
- C) interview
- D) survey

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47) From the following, identify an accurate statement about case studies.
- A) They do not involve observations that stretch for over a year.
- B) They are based on one-on-one relationships.
- C) They involve collecting data about different legal cases that are under trial.
- D) They involve scientific experimentations on different groups of animals.

48) The following is an excerpt from an in-depth paper Dr. Smith, a therapist, wrote about her client: "Irene experienced the loss of her parents at an early age. She is now 36, divorced, and has two children. Irene has difficulty maintaining steady employment. Eight months ago, she was diagnosed with major depressive disorder. Irene is responding well to an experimental antidepressant and to cognitive behavioral therapy. She has a hopeful prognosis." This research method can be best termed as a(n)
- A) interview.
- B) case study.
- C) naturalistic observation.
- D) survey.

49) In a naturalistic observation, a researcher
- A) asks people directly or indirectly what they think, feel, or have done.
- B) observes one person, often over a long period of time.
- C) observes and records behavior in the real world.
- D) asks questions that can have completely open-ended answers.

50) An advantage of naturalistic observation is that it
- A) allows researchers to learn from the lives of historically important people.
- B) gives researchers a look at real behavior in the real world.
- C) makes it easier for researchers to manage large numbers of participants.
- D) allows researchers to ask people directly or indirectly what they think or feel.

51) Primatologist Chan Lee studied different groups of gorillas over a period of 18 years. She studied them daily in the subtropical forests of Africa to understand their mating and reproductive habits. Based on her observations, Chan found that male gorillas are ready to mate when they are 15 years of age. In this scenario, descriptive method of research used by Chan can be best termed as a(n)
- A) interview.
- B) case study.
- C) naturalistic observation.
- D) survey.

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52) Which of the following statements is TRUE of interviews as an example of qualitative research?
A) They can be easily used for summarizing and calculating trends and averages.
B) They always evoke structured answers.
C) They enable researchers to observe and record behavior in the real world.
D) They involve data gathered from open-ended answers rather than numeric answers.

53) _____ is defined as research that collects information using any kind of numeric and measurable scale and often has limited response options.
A) Qualitative research
B) Quantitative research
C) Descriptive research
D) Ethnographic research

54) _____ is defined as the procedure researchers use to obtain participants from a population.
A) Validation
B) Replication
C) Sampling
D) Interpreting

55) A representative sample is a
A) subset of a population that truly reflects the characteristics of that population.
B) randomly generated series of numbers that help researchers select people to participate in a study.
C) research method that employs such techniques as interviewing and surveying.
D) selected group of people whom the researcher can easily persuade to participate in a study.

56) _____ are useful when the variables cannot be manipulated or controlled by the experimenter.
A) Correlational studies
B) Experimental studies
C) Naturalistic observations
D) Case-control studies

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57) The major limitation of the correlational approach is that it
- A) is not useful when the experimenter cannot manipulate or control the variables.
- B) increases the probability of social desirability bias.
- C) does not establish whether one variable actually causes the other.
- D) fails to accurately record the thoughts and feelings of people.

58) _____ indicate whether two variables relate to each other and the direction of the relationship.
- A) Confounding variables
- B) Random assignments
- C) Experiments
- D) Correlation coefficients

59) Correlation coefficients tell us whether two variables (e.g., X and Y) relate to each other and that they range between -1.00 and +1.00. Coefficients near 0.00 are an indication of
- A) the dependency of variable X on variable Y.
- B) the lack of any relationship between variables X and Y.
- C) an increase in variable X as variable Y decreases.
- D) a decrease in variable Y as variable X increases.

60) What happens as a correlation approaches +1.00 or -1.00?
- A) The strength of the relationship increases.
- B) The strength of the relationship remains constant.
- C) The two variables become interdependent of on each other.
- D) The strength of the relationship decreases.

61) When interpreting correlations, it is important to remember that a
- A) correlation does not mean there is a causal relationship between the two variables.
- B) correlation does not lead to any causal relationship between the two variables.
- C) relationship between the variables does not exist as the correlation approaches +1.00.
- D) relationship between the variables does not exist as the correlation approaches -1.00.

62) A(n) _____ is defined as a research design that includes in-dependent and dependent variables and random assignment of partici-pants to control and experimental groups or conditions.
- A) experiment
- B) sample
- C) population
- D) performance

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63) Which of the following is a unique characteristic of a true experiment?
- A) observation of one person, often over a long period of time
- B) experimental manipulation of a predicted cause, the independent variable
- C) predetermined assignment of participants to control
- D) causal relationships between variables

64) Which of the following statements is TRUE of an independent variable in a true experiment?
- A) It is an attribute that is kept constant under all conditions.
- B) Its responses depend on the way in which the dependent variable is treated.
- C) It is the condition the researcher predicts will cause a particular outcome.
- D) It is the outcome, or response to the experimental manipulation.

65) The _____ variable in an experiment is an attribute that is manipulated by an experimenter under controlled conditions.
- A) quantitative
- B) independent
- C) confounding
- D) outcome

66) A(n) _____ variable is the outcome, or response to an experimental manipulation.
- A) predictor
- B) experimental
- C) categorical
- D) dependent

67) _____ is defined as a method used to assign participants to different research conditions to guarantee that all participants have the same chance of being in any specific group.
- A) A correlation study
- B) Controlling
- C) Sampling
- D) Random assignment

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68) Why is random assignment critical for research studies?
- A) because conditions in study groups cannot be controlled and cause-and-effect relationships between variables cannot be demonstrated
- B) because it restricts the possible answers in a survey to some kind of a numeric rating scale
- C) because it ensures that on average the groups in an experiment will be similar with respect to all possible variables when the experiment begins
- D) be-cause it helps to establish that correlation is the same as causation and that these terms are interchangeable

69) A control group differs from an experimental group in that the control group
- A) does not receive the independent variable, or treatment.
- B) is not treated in the exact same manner as the experimental group.
- C) must not be equivalent to the experimental group at the outset of an experimental study.
- D) does not get a substance or treatment that appears identical to the actual treatment.

70) Dr. Adriana conducts a study to determine if players who wear a new type of soccer uniform made from a specially designed fabric will perform better in soccer matches. She recruits a professional soccer team to participate in her study. She randomly assigns half of the men to wear the new-material uniforms made in the color blue and the other half to wear old-material uniforms made in the color red. Although the men know about the test, they are not told which one of the two uniforms is made from the new material. They are asked to wear their assigned uniforms and score as many goals as possible in a game against one another. Dr. Adriana notes the number of goals scored. Ultimately, the players who are wearing the old uniforms score more goals, and therefore, win the game. Dr. Adriana speculates that the new uniforms are not more beneficial to performance than the old uniforms, but she decides to conduct the test a few more times. What is the dependent variable in Dr. Adriana's study?
- A) the old uniforms
- B) the new uniforms
- C) the number of goals scored
- D) the color blue or red

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71) Dr. Adriana conducts a study to determine if players who wear a new type of soccer uniform made from a specially designed fabric will perform better in soccer matches. She recruits a professional soccer team to participate in her study. She randomly assigns half of the men to wear the new-material uniforms made in the color blue and the other half to wear old-material uniforms made in the color red. Although the men know about the test, they are not told which one of the two uniforms is made from the new material. They are asked to wear their assigned uniforms and score as many goals as possible in a game against one another. Dr. Adriana notes the number of goals scored. Ultimately, the players who are wearing the old uniforms score more goals, and therefore, win the game. Dr. Adriana speculates that the new uniforms are not more beneficial to performance than the old uniforms, but she decides to conduct the test a few more times. What is the independent variable in Dr. Adriana's study?

A) the type of uniform worn—made from old or new material
B) the number of goals scored by the players
C) the players who did not know their roles in the study
D) the players attempting to score as many goals as possible

72) Dr. Adriana conducts a study to determine if players who wear a new type of soccer uniform made from a specially designed fabric will perform better in soccer matches. She recruits a professional soccer team to participate in her study. She randomly assigns half of the men to wear the new-material uniforms made in the color blue and the other half to wear old-material uniforms made in the color red. Although the men know about the test, they are not told which one of the two uniforms is made from the new material. They are asked to wear their assigned uniforms and score as many goals as possible in a game against one another. Dr. Adriana notes the number of goals scored. Ultimately, the players who are wearing the old uniforms score more goals, and therefore, win the game. Dr. Adriana speculates that the new uniforms are not more beneficial to performance than the old uniforms, but she decides to conduct the test a few more times. From a scientific viewpoint, why was it important for Dr. Ariana to randomly assign the players to wear new or old uniforms?

A) she wanted to make sure that the uniforms do not affect the outcome of the game played by the players.
B) she wanted the players to feel they all had a chance of wearing their old uniforms, in which they would likely be more comfortable.
C) she wanted to ensure that the performance of the players will be uniformly improved by wearing their respective uniforms.
D) she wanted to ensure that each player had an equal chance of wearing the new or old uniform.

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73) Dr. Adriana conducts a study to determine if players who wear a new type of soccer uniform made from a specially designed fabric will perform better in soccer matches. She recruits a professional soccer team to participate in her study. She randomly assigns half of the men to wear the new-material uniforms made in the color blue and the other half to wear old-material uniforms made in the color red. Although the men know about the test, they are not told which one of the two uniforms is made from the new material. They are asked to wear their assigned uniforms and score as many goals as possible in a game against one another. Dr. Adriana notes the number of goals scored. Ultimately, the players who are wearing the old uniforms score more goals, and therefore, win the game. Dr. Adriana speculates that the new uniforms are not more beneficial to performance than the old uniforms, but she decides to conduct the test a few more times. What was the experimental group in Dr. Adriana's study?

A) the players who wore red uniforms made from the old material
B) the players who wore blue uniforms made from the new material
C) the players who scored more goals
D) the players who could not score any goals, irrespective of the color of their uniforms

74) Dr. Adriana conducts a study to determine if players who wear a new type of soccer uniform made from a specially designed fabric will perform better in soccer matches. She recruits a professional soccer team to participate in her study. She randomly assigns half of the men to wear the new-material uniforms made in the color blue and the other half to wear old-material uniforms made in the color red. Although the men know about the test, they are not told which one of the two uniforms is made from the new material. They are asked to wear their assigned uniforms and score as many goals as possible in a game against one another. Dr. Adriana notes the number of goals scored. Ultimately, the players who are wearing the old uniforms score more goals, and therefore, win the game. Dr. Adriana speculates that the new uniforms are not more beneficial to performance than the old uniforms, but she decides to conduct the test a few more times. What was the control group in Dr. Adriana's study?

A) the players who wore red uniforms made from the old material
B) the players who wore blue uniforms made from the new material
C) the players who scored less goals
D) the players who could not score any goals, irrespective of the color of their uniforms

75) A(n) _____ consists of participants who receive the treatment or whatever is thought to change behavior.

A) social group
B) control group
C) experimental group
D) peripheral group

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76) The participants in a(n) _____ do not receive the independent variable or treatment.
A) control group
B) experimental group
C) core group
D) social group

77) Few of the patients undergoing treatment for phobic disorder agree to participate in a clinical trial of a new antidepressant medication. The patients are randomly divided into two groups. Both groups receive pills to be taken on a daily basis, but only one of the groups receives pills with the newly produced active ingredients. The other group's pills contain no active ingredients. In this study, the group that receives the pills that do not contain the active ingredients is called the
A) treatment group.
B) control group.
C) social group.
D) experimental group.

78) Few of the patients undergoing treatment for phobic disorder agree to participate in a clinical trial of a new antidepressant medication. The patients are randomly divided into two groups. Both groups receive pills to be taken on a daily basis, but only one of the groups receives pills with the newly produced active ingredients. The other group's pills contain no active ingredients. In this study, the pills that do not contain any active ingredients are said to be
A) placebos.
B) ipsatives.
C) nocebo.
D) normatives.

79) _____ can be defined as those studies in which participants do not know the experimental condition (group) to which they have been assigned.
A) Case studies
B) Single-blind studies
C) Interviews
D) Descriptive studies

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80) Ravi is a participant in a cognitive experiment, but he does not know if he is in the experimental group or the control group. The researchers, however, are aware of the condition to which he has been assigned. The study in which Ravi is participating is called a(n)
A) single-blind study.
B) double-blind study.
C) survey.
D) interview.

81) Which of the following is an advantage of a double-blind study?
A) It prevents experimenter expectancy effects.
B) It ensures that participants know the experimental condition to which they have been assigned.
C) It prevents confounding variables from influencing an experiment.
D) It ensures that any differences between participants are not affected by the independent variable.

82) _____ are defined as subtle cues, often unconscious, given by experimenters to the participants as to how they should behave in the role of participant.
A) Placebo effects
B) Longitudinal designs
C) Experimenter expectancy effects
D) Demand characteristics

83) _____ can be defined as studies in which neither the participants nor the researchers administering the treatment know who has been assigned to which experimental condition.
A) Double-blind studies
B) Case-control studies
C) Surveys
D) Interviews

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84) Which of the following is an advantage of double-blind studies?
- A) They reduce the time to train coders to use the coding schemes, to collect behavioral data, and to prepare the coded data for analysis.
- B) They allow researchers to unintentionally affect the outcome if they are aware of a study's hypotheses.
- C) They prevent two potential problems with experimental designs, namely experimenter expectancy effects and demand characteristics.
- D) They allow experimenters to give subtle cues to the participants as to how they should behave in the role of participant.

85) Which of the following is a difference between single-blind studies and double-blind studies?
- A) In single-blind studies, confounding variables are limited by independent and dependent variables, whereas in double-blind studies, the influence of confounding variables is not limited.
- B) Single-blind studies make use of naturally occurring groups, whereas double-blind studies randomly assign subjects to groups.
- C) In single-blind studies, participants do not know the experimental condition to which they have been assigned, whereas in double-blind studies, neither the participants nor the researchers know who has been assigned to which condition.
- D) Single-blind studies occur when subtle cues are given by experimenters to the participants as to how they should behave, whereas double-blind studies occur when the behavior of the participants is influenced by the experimenter's knowledge.

86) The _____ can be defined as results that occur when the behavior of the participants is influenced by the experimenter's knowledge of who is in the control group and who is in the experimental group.
- A) experimenter expectancy effect
- B) subject-expectancy effect
- C) placebo effect
- D) nocebo effect

87) Thanks to Robert Rosenthal's "mistake" in his dissertation, we now realize the importance of _____ not knowning who has been assigned to the experimental or control group.
- A) the researcher and experimenter
- B) the researcher
- C) the experimenter
- D) the participants

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88) _____ make observations of the same people over time, ranging from months to decades.
A) Correlational designs
B) Longitudinal designs
C) Quasi-experimental designs
D) Descriptive designs

89) _____, a method of studying heritability, allow researchers to assess how genetic differences interact with the environment to produce certain behavior in some people but not in others.
A) Gene–environment correlations
B) Longitudinal studies
C) Twin-adoption studies
D) Gene-by-environment interaction research

90) The genetic similarity of identical twins is
A) 100%.
B) 50%.
C) 75%.
D) somewhere between 50% and 100%.

91) A _____ is best defined as a quantitative method for combining the results of all the published and even unpublished results on one question and drawing a conclusion based on the entire set of studies on the topic.
A) meta-analysis
B) case study
C) naturalistic observation
D) systematic review

92) To do a _____, the researcher converts the findings of each study into a standardized statistic known as effect size.
A) research planning
B) systematic review
C) random assignment
D) meta-analysis

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93) _____ is a measure of the strength of the relationship between two variables.
- A) Sample size
- B) Effect size
- C) Z-value
- D) A self-report

94) Which of the following is an indication of whether all of the research on a topic has or has not led to consistent findings and of the size of an experimental effect?
- A) nocebo
- B) micro-analysis
- C) meta-analysis
- D) placebo

95) _____ consists of the extremely vast amounts of information from websites and apps that is collected and analyzed by unusually large and sophisticated computer programs.
- A) Data Link Layer
- B) Big Data
- C) Meta-analysis
- D) Computer modeling

96) Which of the following is an example of a self-fulfilling prophecy?
- A) Chang says, "I am going to buy my mother a sweater for her birthday" but ends up buying her a scarf.
- B) Margaret says, "I am going to hate this party!" and then has a bad time at the party because she refuses to interact with anyone.
- C) Sharon says, "I want you to buy the diamond ring right away," and her husband buys it.
- D) Dominique says, "I am going to make the best pie anyone has ever eaten!" and ends up making a bad pie.

97) How can the term "measures" be best defined in the context of psychological research?
- A) They are the steps taken to ensure that a study provides unbiased results.
- B) They are the steps taken to ensure that experimenters do not control the outcome of a study.
- C) They are the tools and techniques used to modify the results of a study.
- D) They are the tools and techniques used to assess thought or behavior.

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98) _____ are defined as people's written or oral accounts of their thoughts, feelings, or actions.
- A) Self-reports
- B) MIS reports
- C) Behavioral measures
- D) Physiological measures

99) In _____, the answers are often open-ended and not constrained by the researcher.
- A) experiments
- B) interviews
- C) questionnaires
- D) case studies

100) In a(n) _____, responses are limited to the choices given.
- A) case study
- B) questionnaire
- C) interview
- D) experimental study

101) Which of the following is an accurate statement about self-report questionnaires?
- A) In self-report questionnaires, the answers are often open-ended and not constrained by the researcher.
- B) In self-report questionnaires, people are always the best sources of information about themselves.
- C) Self-report questionnaires are widely used in psychological research as they help in avoiding social desirability bias.
- D) Self-report questionnaires are easy to use, especially in the context of collecting data from a large number of people at once.

102) _____ is defined as the tendency toward favorable self-presentation that could lead to inaccurate self-reports.
- A) Meta-analysis
- B) Self-fulfilling prophecy
- C) Social desirability bias
- D) Experimenter expectancy effect

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103) _____ involve the systematic observation of people's actions either in their normal environment or in a laboratory setting.
A) Questionnaires
B) Physiological measures
C) Behavioral measures
D) Interviews

104) Which of the following statements is TRUE about behavioral measures?
A) Behavioral measures are more susceptible to social desirability bias than are self-report measures.
B) Behavioral measures provide more objective measurements because they come from a trained outside observer.
C) Behavioral measures do not allow people to modify their behavior even if they know they are being observed.
D) Behavioral measures are not very time-intensive as collecting behavioral data does not take a long time.

105) Which of the following is a drawback of behavioral measures in psychological research?
A) People may modify their behavior if they know they are being observed or measured.
B) Researchers need specialized training on expensive equipment, on how to collect measurements, and on data interpretation.
C) Behavioral measures are more susceptible to social desirability bias than are self-report measures.
D) Researchers lack clear insight of participants' behavior.

106) Rita conducts a study in which she videotapes college students interacting with each other before and after performing a series of cognitive tasks that were presented as "Intelligence tests that can affect your college tuition charges." She then has a carefully trained team observe and record the participants' actions, noting visible signs of anxiety in particular. What type of measure best describes the one used by Rita?
A) physiological
B) self-report
C) behavioral
D) statistical

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107) _____ can be defined as measures of bodily responses, such as blood pressure or heart rate, used to determine changes in psychological state.

A) Interviews
B) Questionnaires
C) Behavioral measures
D) Physiological measures

108) Dr. Singh, a scientist, wants to study how anxiety affects adolescents. For this purpose, he measures the electrical changes in their heart rates, their sweating and respiration patterns, as well as the hormonal changes in their blood. Which psychological measure has been used by Dr. Singh in this scenario?

A) interviews
B) questionnaires
C) physiological measures
D) behavioral measures

109) _____ are the rules governing the conduct of a person or group in general or in a specific situation and are also regarded as standards of right and wrong.

A) Antics
B) Ekistics
C) Ethics
D) Analytics

110) Ben, a well-known scientist, published many research papers on genetics and its influence on human behavior. He copied some of the research findings of his junior, Jill, for a research paper on gene therapy. This was done without Jill's consent. Ben was later sued for this inappropriate act. Identify the scientific misconduct committed by Ben.

A) collaborationism
B) fabrication
C) plagiarism
D) falsification

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111) George was a scientist with a government-funded research organization. The government had provided funds to conduct studies among children on the medicines available for epilepsy. However, George did not conduct the specified studies among the experimental group of children. He concocted false data and research reports as he neared the deadline. Identify the scientific misconduct that George committed in this scenario.

A) collaborationism
B) fabrication
C) plagiarism
D) falsification

112) Informed consent to participate in a psychological study means that the

A) participant knows his or her role in the study and understands its risks and benefits.
B) researcher carefully selects and approves each participant for the study.
C) institution in which the study will be conducted has approved the study.
D) the consent cannot be omitted even for completely anonymous surveys.

113) It is vital to safeguard the dignity and autonomy of individuals and take extra precautions when dealing with study participants, such as children, who are less likely to understand their participation is voluntary. This guideline of psychological research is known as

A) beneficence.
B) respect for persons.
C) informed consent.
D) justice.

114) Institutions conducting research should evaluate every proposed study's beneficence, which is

A) each participant's guarantee that no personal, and confidential information will be revealed.
B) each person's awareness that he or she can discontinue participation at any time.
C) minimizing costs for participants and maximizing benefits.
D) the extent to which the participant knows his or her role in the study.

115) In research analysis and reports, data are never directly aligned with an individual respondent, thereby protecting his or her identity. Thus, _____ is maintained.

A) credibility
B) reliability
C) validity
D) confidentiality

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116) Under the guidelines of _____, researchers must design studies in which the participants will share equally the costs and benefits of participating in the study.
A) beneficence
B) justice
C) confidentiality
D) respect for persons

117) Irene Bialy, a psychologist, wants to study how the habit of telling lies affects marital relationships. She contacts married couples from across the country to participate in her study. She lets them know that the only cost of participation would be that they would need to reveal if they have ever lied to their parents. Irene also informs them that they will be paid an amount of $1,000 each for participating in the study. In this scenario, which guideline of psychological research best describes the one followed by Irene?
A) beneficence
B) justice
C) confidentiality
D) privacy

118) Debriefing is the process of
A) informing participants about the costs and benefits of participation.
B) protecting the privacy of participants.
C) distributing the benefits and costs of a study equally among participants.
D) informing and explaining the exact purposes of a study following data collection.

119) Which of the following statements is TRUE of debriefing in research studies?
A) It is required to minimize any negative effects ex-perienced as a result of deception.
B) It is required to generate, test, and revise theories.
C) It involves choosing tools that will create the conditions of a study.
D) It involves the observation of one person, often over a long period of time.

120) Which of the following is a function of institutional review boards (IRBs)?
A) They collect informed consent from human participants before a study begins.
B) They inform participants of the exact purposes of a study—including the hypotheses—revealing all deceptive practices.
C) They organize data for interpretation and help researchers evaluate their hypotheses.
D) They evaluate proposed research before it is conducted to ensure research involving humans does not cause undue harm.

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121) Why is animal research widely considered to be acceptable?

A) Animal research has led to many treatments for diseases, such as cancer and heart disease.

B) Researchers do not have to carry out treatment of animals at the expense of their research.

C) Government and animal rights associations consent to animal research.

D) There is an ongoing debate as to how much animal research should be permissible at all.

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Answer Key

Test name: Chapter 02

1) C
2) D
3) B
4) C
5) A
6) C
7) D
8) B
9) D
10) D
11) A
12) D
13) C
14) B
15) A
16) B
17) C
18) C
19) D
20) A
21) B
22) A
23) B
24) C
25) D
26) D
27) C
28) B
29) A
30) B
31) D
32) B
33) C
34) C
35) C
36) C

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37) D
38) A
39) D
40) C
41) A
42) C
43) D
44) A
45) D
46) B
47) B
48) B
49) C
50) B
51) C
52) D
53) B
54) C
55) A
56) A
57) C
58) D
59) B
60) A
61) A
62) A
63) B
64) C
65) B
66) D
67) D
68) C
69) A
70) C
71) A
72) D
73) B
74) A
75) C
76) A

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77) B
78) A
79) B
80) A
81) A
82) D
83) A
84) C
85) C
86) A
87) A
88) B
89) D
90) A
91) A
92) D
93) B
94) C
95) B
96) B
97) D
98) A
99) B
100) B
101) D
102) C
103) C
104) B
105) A
106) C
107) D
108) C
109) C
110) C
111) B
112) A
113) B
114) C
115) D
116) B

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117) A
118) D
119) A
120) D
121) A

Chapter 2: Scientific Thinking and Research in Psychology

BRIEF CHAPTER OUTLINE

Science and Scientific Thinking
- Common Sense and Logic
- The Limits of Observation
- What Is Science?
- Thinking Scientifically
  - Keep Belief and Evidence Distinct
  - Make Testable Claims
  - Evaluate the Strengths and Weaknesses of the Evidence
  - Disconfirm Your Idea After It Has Been Confirmed
  - Have Your Belief Follow the Best Evidence
- The Scientific Method
- What Science Is Not: Pseudoscience

Research Designs in Psychology
- Principles of Research Design
- Descriptive Studies
  - Case Study
  - Naturalistic Observation
  - Qualitative Research
  - Survey Research
- Correlational Studies
- Experimental Studies
  - Challenging Assumptions in the Objectivity of Experimental Research
- Longitudinal Studies
- Twin-Adoption Studies
  - Twin-Adoption Studies
  - Gene-by-Environment Studies
- Meta-Analysis
- Big Data

Commonly Used Measures of Psychological Research
- Self-Report Measures
- Behavioral Measures
- Physiological Measures

Research Ethics
- Scientific Misconduct
- Ethical Treatment of Human Participants

Ethical Treatment of Animals

Bringing It All Together: Making Connections in Research Methods: Different Methods Used By Subdisciplines in Psychology
Chapter Review

EXTENDED CHAPTER OUTLINE

- Zimbardo's Stanford Prison Experiment
    - Zimbardo set out to examine whether normal people might behave in extreme ways when thrust into situations that place certain demands of them.
    - Zimbardo screened 21 male student volunteers and assigned them to be either "guards" or "prisoners" in a simulated prison environment for 2 weeks. All were briefed beforehand about what conditions would be like in the mock prison. All the students signed a form consenting to participate.
    - Six days into the simulation, however, Zimbardo ended the study because the students were playing their roles too well.
        - Prisoners went back and forth between plotting riots and having emotional breakdowns such as getting sick and crying.
        - Guards became extremely authoritarian, restricting almost all personal freedom of the prisoners.
- One of the goals of modern psychological research is to understand human behavior in a sound, objective, and scientific manner while observing guidelines for the physical and emotional well-being of the people or animals being studied.
    - Formal ethical guidelines, however, were first proposed in the United States in 1966 and only became law in 1974. This is *after* Zimbardo conducted his study. You may want to ask students if they think that his study would have been approved by IRBs today.

SCIENCE AND SCIENTIFIC THINKING

Common Sense and Logic

- Common sense is the intuitive ability to understand the world.
- **Rationalism** is the view that using logic and reason is the way to understand how the world works.
- Logic tells us how the world *should* work.

CONNECTION: How do psychologists tease apart how much of a trait is due to genetics and how much is due to environment? A common approach is to study twins (both identical and fraternal) who are reared apart or reared together. See "The Relative Effects of Genes and Environment Can Be Teased Apart," in the chapter "The Biology of Behavior."

The Limits of Observation

- Our knowledge of the world comes through our five senses, but the way in which the brain organizes and interprets sensory experiences may vary from person to person, making observation potentially faulty.
- Another problem with observation is that people tend to generalize from their observations and assume that what they witnessed in one situation applies to all similar situations.

What Is Science?

- Science can be thought of in three distinct areas: physical, biological, and social.
    - As mentioned in Chapter 1, psychology is a *social* science.

Thinking Scientifically

- **Scientific thinking** is a process using the cognitive skills required to generate, test, and revise theories.
- There are at least five characteristics of scientific thinking:
    1. Keep belief and evidence distinct
    2. Make testable claims
    3. Evaluate the strengths and weaknesses of the evidence
    4. Try to disconfirm your idea after it has been confirmed
    5. Have your belief follow the best evidence

The Scientific Method

- The **scientific method** is made up of six basic processes that you can remember by the word OPTICR: Observe, Predict, Test, Interpret, Communicate, and Replicate.
- In the *observation* and *prediction* stages of a study, researchers observe the world and look for patterns.
    - A **theory** is a set of related assumptions from which testable predictions can be made. They organize and explain what we have observed and guide what we will observe.
    - A **hypothesis** is a specific, informed, and testable prediction of what kind of outcome should occur under a particular condition.
- The third stage is the *testing* of these hypotheses. To do this, researchers select both an appropriate method of testing and the appropriate measurement techniques.
    - **Reliability** is the consistency of a measurement, such as an intelligence test.
    - **Validity** is the degree to which a test accurately measures what it purports to measure, such as intelligence, and not something else, and the degree to which it predicts real-world outcomes.

- In the fourth stage, researchers use mathematical techniques to *interpret* the results and determine whether they are beyond chance and a close fit to their prediction or not. You may want to use this as an opportunity to explain why psychology majors need to take statistics!
- The fifth stage of the scientific method is to *communicate* the results. Generally, scientists publish their findings in an established, peer-reviewed, professional journal, but they can also give talks and poster presentations. Written communications follow a standardized format (called APA [vs. MLA] style), whereby the researchers report their hypothesis, describe their research design and the conditions of the study, summarize the results, and share their conclusions.
- The sixth stage is to independently *replicate* the findings. Replication is the repetition of a study to confirm the results. The advancement of science hinges on results being replicated. This is how the process of scientific discovery is cumulative. Previous knowledge builds on older knowledge.

CONNECTION: Are IQ and personality tests reliable and valid? See "Measuring Intelligence" in the chapter "Intelligence, Problem Solving, and Creativity;" and "How Is Personality Measured?" in the chapter "Personality: The Uniqueness of the Individual."

What Science Is Not: Pseudoscience

- **Pseudoscience** refers to practices that appear to be and claim to be science but in fact do not use the scientific method to come to their conclusions.
- Pseudoscience practitioners:
    1. make no real advances in knowledge,
    2. disregard well-known and established facts that contradict their claims,
    3. do not challenge or question their own assumptions,
    4. tend to offer vague or incomplete explanations of how they came to their conclusions, and
    5. tend to use unsound logic in making their arguments.
- Examples of pseudoscience include alchemy, creation science, intelligent design, perpetual motion machines, astrology, alien abduction, psychokinesis, and some forms of mental telepathy.

RESEARCH DESIGNS IN PSYCHOLOGY

Principles of Research Design

- **Research designs** are plans of action for how to conduct a scientific study.
- A general goal of psychological research is to measure change in behavior, thought, or brain activity**.** A **variable** is anything that changes or "varies" within or between people. Psychologists do research by predicting how and when variables influence each other.

    - Examples of variables are age, personality traits, gender, and mental disorders.
- Researchers must pay attention to how they obtain participants for their studies.
    - The first step in obtaining a sample is for the researchers to decide the makeup of the entire group, or **population** in which they are interested (e.g., all college students, all men, all adolescents, all African Americans).
    - Populations are too large to survey or interview directly, so researchers draw on small subsets from each population to study, called **samples**.
        - If researchers want to draw valid conclusions or make accurate predictions about the population, it is important that they have samples that accurately represent the population in terms of age, gender, ethnicity, or any other variables that might be of interest.

Descriptive Studies

- Single events and single cases often lead to new ideas and new lines of research (e.g., the Kitty Genovese murder).
- In **descriptive designs,** the researcher makes no prediction and does not control or manipulate any variables. The researcher defines a problem and describes the variable of interest.
- These types of studies generally occur during the exploratory phase of research.

Case Study

- Involves a psychologist observing one person often over a long period of time.
- Offer deep insights that surveys and questionnaires often miss because they are based on a one-on-one relationship lasting over years.
- Some studies examine in detail the lives of historically important people.
- They do not test hypotheses but can be a rich source for hypotheses.
- Caution! Not all cases are generalizable to other people. That is why we don't stop with case studies but use them to develop testable and more general predictions.

Naturalistic Observation

- The researcher tries to be as unobtrusive as possible and observes and records behavior in the real world.
- Naturalistic observation is more often the design of choice in comparative psychology by researchers who study nonhuman behavior (usually primates) to determine what is and is not unique about our species. A good example is Jane Goodall.

- The advantage of naturalistic observation is that it gives researchers a look at real behavior in the real world, rather than in a controlled setting where people might not behave naturally.
- Caution! Because conditions cannot be controlled and cause-and-effect relationships between variables cannot be examined, these studies are rarely done.

Qualitative Research

- This is research that involves data gathered from open-ended and unstructured answers rather than quantitative or numeric answers.
- **Interviews** occur between two people, one asking questions and the other answering them and the answers are open-ended. Sometimes interview questions are predetermined, and sometimes they are spontaneous.

Survey Research

- **Quantitative research** collects information using any kind of numeric and quantifiable scale and often has limited response options.
- Pitfalls include sampling problems such as not being representative and biased responses.
  - Ideally, researchers want to have a **representative sample** in which the sample truly represents the population of people one is studying.
  - **Sampling** is the procedure researchers use to obtain participants from a population.

Correlational Studies

- **Correlational designs** measure two or more variables and their relationship to one another (e.g., how is variable X related to variable Y).
- Correlational studies are useful when the variables cannot be manipulated. For example, you can't randomly assign a child to live with their mother or their father. You also can't manipulate whether someone has schizophrenia or not.
- The major limitation of the correlational approach is that it does not establish whether one variable actually causes the other or vice versa. Correlation is not causation!
- A **correlation coefficient** is a statistic that tells us whether two variables relate to each other and the direction of the relationship.
  - Correlations range between −1.0 and +1.0, with coefficients near 0.00 telling us there is no relationship between the two variables. As a correlation approaches ±1.00, the strength of the relationship increases.
  - Correlation coefficients can be positive or negative. If the relationship is positive, then as a group's score on *X* goes up, their score on *Y* also goes up. With a negative correlation, as a group's score on X goes up, their score on Y goes down.

Experimental Studies

- A true **experiment** has two crucial characteristics.
    1. First, experimental manipulation of a predicted cause, the independent variable.
    2. Second, random assignment of participants to control and experimental groups or conditions.
- The **independent variable** in an experiment is an attribute that is manipulated by the experimenter, while other aspects of the study are held constant.
- The **dependent variable** is the outcome or response to the experimental manipulation.
- **Random assignment** is the method used to assign participants to different research conditions so that each person has the same chance of being in one group as another. Random assignment is critical because it assures that *on average* the groups will be similar with respect to certain variables.
    - Why is this important? Because if the groups are the same on these qualities at the beginning of the study, then any differences between the groups at the end of the experiment are likely to be the result of the experiment.
    - The **experimental group** consists of those participants who will receive the treatment or the independent variable.
    - The **control group** consists of participants who are treated exactly in the same manner as the experimental group but who do not receive the independent variable or treatment.
        - They may instead be given a **placebo,** a substance or treatment that appears identical to the actual treatment but lacks the active substance.
- Experimental design allows us to determine causality if the independent variable caused changes in the dependent variable and everything else is held constant.
    - Researchers must also be careful to treat the two groups alike and make sure that all environmental conditions (e.g., noise level and room size) are equivalent.
- How much participants and experimenters know about the experimental conditions to which participants have been assigned can also affect outcome.
    - **Single-blind studies** are designs in which participants do not know the experimental condition to which they have been assigned. This must be the case in all studies to avoid the possibility that participants will behave in a biased way. For example, if participants know they have been assigned to a group that receives a new training technique on memory, then they might try harder to perform well. This would confound the results.

- In **double-blind studies** neither the participants nor the researchers know who has been assigned to which condition. This design prevents two potential problems:
  - **Experimenter expectancy effects** that occur when the behavior of the participants is influenced by the experimenter's knowledge.
  - **Demand characteristics** that are subtle cues given by experimenters to the participants as to how they should behave in the role of participant.
    - This was a problem in the Zimbardo Stanford Prison study. Zimbardo informed the "guards" that they could create fear, boredom, lack of privacy and control, and the subjects did what the experimenter suggested.

Challenging Assumptions in the Objectivity of Experimental Research

- Robert Rosenthal hypothesized that people who believed they were successful would be more likely to see success in others.
- To test this idea, he conducted an experiment in which he told one group of participants that they had done well on an intelligence test and another group that they had done poorly on an intelligence test. Rosenthal randomly assigned participants to be in one of these conditions (there was also a neutral control condition where participants were not given any feedback after the intelligence test). Then, he asked all groups to examine photographs of people doing various tasks and rate how successful they thought the people in the photos were.
- He compared the average scores of the participants assigned to different conditions *before* doing anything to them. Unfortunately, the groups were not only different at the outset, but they were different in exactly the way that favored his hypothesis.
- Because he used random assignment, the only difference in the groups at the outset was Rosenthal's knowledge of who was in which group. Somehow, by knowing who was in which group, he unintentionally created behaviors that favored his hypothesis.
- Rosenthal had discovered experimenter expectancy effects. He also found that if the study involves direct interaction between an experimenter and participants, the experimenter's age, ethnicity, personality, and gender can have an effect on the participants' behavior.
- Rosenthal stumbled upon a more general phenomenon known as **self-fulfilling prophecy,** a statement that changes events to cause a belief or prediction to become true.
- Within 10 years, more than 300 other studies confirmed Rosenthal's results in both human and animal experiments.
- Their research led to the development of double-blind procedures.

Longitudinal Studies

- The only way to study change over time is with **longitudinal designs**, making observations of the same people over time, ranging from months to decades.
- Longitudinal studies often combine observational, correlational, and quasi-experimental techniques.

Twin-Adoption Studies

- One overarching question in the study of psychology is how much of our thought, behavior, personality, and mental health stems from built-in biological forces (nature) and how much is from learning and the environment (nurture). Two research methods help psychologists to investigate this question:
    - **Twin-Adoption Studies**
        - These studies do research into hereditary influence on twins, both identical and fraternal, who were raised apart (adopted) and who were raised together.
        - **Identical twins** are twins that develop from a single fertilized egg that splits into two independent cells. They have 100% genetic similarity.
        - **Fraternal twins** are twins that develop from two different eggs fertilized by two different sperm. They have 50% genetic similarity.
        - Adopted siblings have 0% genetic similarity.
    - **Gene-by-Environment Studies**
        - **Gene-by-environment interaction research** is a method of studying heritability by comparing genetic markers; allows researchers to assess how genetic differences interact with the environment to produce certain behaviors in some people but not others.

Meta-Analysis

- **Meta-analysis** is a quantitative method for combining the results of all the published and even unpublished results on one question and drawing a conclusion based on the entire set of studies on the topic.
- A researcher converts the findings of each study into a standardized statistic known as effect size. **Effect size** is a measure of the strength of the relationship between two variables or the magnitude of an experimental effect. The average effect size across all studies reflects what the literature overall says on a topic or question.

Big Data

- A new method for collecting data on human behavior has developed due to the increase in storage and speed of the internet, and the proliferation of mobile apps.
- **Big data** involves extremely large amounts of data captured from online behaviors (especially social media), which are then collected and analyzed for patterns by sophisticated analytic programs.

COMMONLY USED MEASURES OF PSYCHOLOGICAL RESEARCH

- The tools and techniques used to assess thought or behavior are called **measures.**

Self-Report Measures

- **Self-reports** are people's written or oral accounts of their thoughts, feelings, or actions.
- Two kinds of self-report measures are commonly used in psychology: interviews and questionnaires.
    - In an interview, a researcher asks a set of questions and the respondent usually answers in any way they feel is appropriate. Answers are either coded into broad categories or simply summarized. The answers are often open-ended and not constrained by the researcher.
    - In a questionnaire, responses are limited to the choices given in the questionnaire.
- Pros of Self-Report Questionnaires
    - Self-report questionnaires are easy to use, especially in the context of collecting data from a large number of people at once or in a short period of time.
    - They are also relatively inexpensive.
    - If designed carefully, they can also provide important information on key psychological variables.
- Cons of Self-Report Questionnaires
    - People are not always the best sources of information about themselves because of **social desirability bias.** This is the tendency toward favorable self-presentation.
    - We have to assume that people are accurate witnesses to their own experiences.

Behavioral Measures

- **Behavioral measures** are based on systematic observation of people's actions, either in their normal environment (i.e., naturalistic observation) or in a laboratory setting. Afterward, trained coders observe the videos and, using a prescribed method, code the level of aggressive behavior exhibited by each person.
- Pros
    - They are less susceptible to social desirability bias than are self-report measures.

    - They provide more objective, direct measurements because they come from a trained outside observer rather than from the participants themselves.
- Cons
    - If people know they are being observed, watched, and/or measured, they may modify their behavior.
    - These studies are time-intensive.

Physiological Measures

- **Physiological measures** are used to collect data on bodily responses such as heart rate, sweating, respiration, and brain activity. Chapter 3 will discuss brain imaging techniques.
- Clearly, the big con here is that these technologies require specialized training in the use of equipment, collection of measurements, and data interpretation. They can therefore be quite costly.

RESEARCH ETHICS

- Some of the most important studies in psychology could not be performed today, including the Stanford Prison Experiment.
- **Ethics** are the rules governing the conduct of a person or group in general or in a specific situation, or more simply, standards of right and wrong.
- Every single psychological study conducted with humans and animals must pass through a rigorous review of its methods by a panel of experts. If the proposed study does not meet the standards, it cannot be approved.

Scientific Misconduct

- Scientific misconduct is intentional and therefore the most serious ethical violation. There are 3 forms:
    - **Plagiarism** is when someone presents words or ideas of other people as their own.
    - **Falsification** is the changing, altering, or deleting scientific data.
    - **Fabrication** is presenting or publishing scientific results that are made up.

Ethical Treatment of Human Participants

- Ethical issues also arise in the treatment of participants and animals. Another notable example of research that would violate current ethics guidelines is Milgram's research on obedience, which will be discussed in more detail in Chapter 14.
    - Milgram designed an experiment to test systematically the question of whether decent people could be made to inflict harm on other people.

    - His studies involved a simulation in which participants were misled to think they were participating in a study on punishment and learning. They administered what they thought were electrical shocks to punish the "learner," who was in another room, for making errors.
    - In spite of protests from the "learner" when increasingly intense shocks occurred, the experimenter pressured the "teachers" to continue administering shocks. Despite his screams, most of the participants continued to shock the learner.
    - After the study, Milgram fully explained to his participants that, in fact, the "learner" was never shocked or in pain at all.
- Today, all psychological and medical researchers must adhere to the following guidelines listed below.
    1. *Informed consent:* Participants must be told, in general terms, what the study is about, what they will do and how long it will take, what the known risks and benefits are, that they have the right to withdraw at any time without penalty, and whom to contact with questions.
    2. *Respect for persons:* The dignity and autonomy of the individual must be protected.
    3. *Beneficence:* Participants should be told the costs and benefits of participation. The costs should be minimized, and the benefits maximized.
    4. *Privacy and confidentiality:* Protect the privacy of the participant, generally by keeping all responses confidential.
    5. *Justice:* The benefits and costs of participation must be distributed equally among participants.
- The APA believes that participant deception should be avoided whenever possible but recognizes that sometimes it is justified. If deception is used then, when the study is over, participants must be **debriefed** or informed of the exact purposes of the study (including the hypotheses), and all deceptive practices must be revealed and explained.
- Today, to ensure adherence to ethical guidelines, **institutional review boards (IRBs**) evaluate proposed research before it is conducted to make sure research involving humans does not cause undue harm or distress.

Ethical Treatment of Animals

- Biological psychology and learning are the areas of psychology that most often use animals for research.
- Animals cannot consent to research but since animal research has led to many treatments for disease, as well as advances in understanding basic neuroscientific processes, the medical and scientific communities, along with the general public, have deemed such research acceptable as long as the general conditions and treatment of the animals is humane.

- Laws generally require housing the animals in clean, sanitary, and adequately sized structures.
- Despite the existence of legal and ethical safeguards and the importance for medical research in humans, some animal rights groups argue that any and all animal research should be discontinued, unless it directly benefits the animals.

BRINGING IT ALL TOGETHER: MAKING CONNECTIONS IN RESEARCH METHODS: Different Methods Used By Subdisciplines in Psychology

KEY TERMS

behavioral measures: measures based on systematic observation of people's actions either in their normal environment or in a laboratory setting.
big data: extremely large amount of data captured from online behaviors (especially social media), which are then collected and analyzed for patterns by sophisticated analytic programs.
case study: a study design in which a psychologist, often a therapist, observes one person over a long period of time.
control group: a group of research participants who are treated in exactly the same manner as the experimental group, except that they do not receive the independent variable, or treatment.

correlation coefficients: a statistic that ranges from −1.0 to +1.0 and assesses the strength and direction of association between two variables.
correlational designs: studies that measure two or more variables and their relationship to one another; not designed to show causation.
debriefing: the process of explaining the purposes of a study to research participants following data collection.
demand characteristics: subtle, often unconscious, cues given by experimenters to the participants as to how they should behave in the role of participant.
dependent variable: in an experiment, the outcome or response to the experimental manipulation.
descriptive designs: study designs in which the researcher defines a problem and variable of interest but makes no prediction and does not control or manipulate anything.
double-blind studies: studies in which neither the participants nor the researchers administering the treatment know who has been assigned to the experimental or control group.
effect size: a measure of the strength of the relationship between two variables or the extent of an experimental effect.
ethics: the rules governing the conduct of a person or group in general or in a specific situation—or, more simply, standards of right and wrong.

experiment: a research design that includes independent and dependent variables and random assignment of participants to control and experimental groups or conditions.
experimental group: a group consisting of those participants who will receive the treatment or whatever is predicted to change behavior.
experimenter expectancy effects: a result that occurs when the behavior of the participants is influenced by the experimenter's knowledge of who is in the control group and who is in the experimental group.
fabrication: presenting or publishing scientific results that are made up.
falsification: changing, altering, or deleting scientific data.
fraternal twins: twins who develop from two different eggs fertilized by two different sperm.
gene-by-environment interaction research: a method of studying heritability by comparing genetic markers; allows researchers to assess how genetic differences interact with the environment to produce certain behaviors in some people but not in others.
hypothesis: a specific, informed, and testable prediction of the outcome of a particular set of conditions in a research design.
identical twins: twins who develop from a single fertilized egg that splits into two independent cells.
independent variable: a property that is manipulated by the experimenter under controlled conditions to determine whether it causes the predicted outcome of an experiment.
institutional review boards (IRBs): organizations that evaluate research proposals to make sure research involving humans does not cause undue harm or distress.
interviews: interactions in which one person asks questions and the other answers them and the answers are open-ended. Sometimes interview questions are predetermined and sometimes they are spontaneous.
longitudinal designs: research that includes observations of the same people over time, ranging from months to decades.
measures: tools and techniques used to assess thought or behavior.
meta-analysis: a research technique for combining all research results on one question and drawing a conclusion.
naturalistic observation: a study in which the researcher unobtrusively observes and records behavior in the real world.
physiological measures: measures of bodily responses, such as blood pressure or heart rate, used to determine changes in psychological state.
placebo: a substance or treatment that appears identical to the actual treatment but lacks the active substance.
plagiarism: presenting words or ideas of other people as one's own.
population: the entire group a researcher is interested in—for example, all humans, all adolescents, all boys, all girls, all college students.

pseudoscience: claims presented as scientific that are not supported by evidence obtained with the scientific method.
qualitative research: research that involves data gathered from open-ended and unstructured answers rather than quantitative or numeric answers.
quantitative research: research that collects information using any kind of numeric and quantifiable scale and often has limited response options.
random assignment: the method used to assign participants to different research conditions, so that all participants have the same chance of being in any specific group.
rationalism: the view that using logic and reason is the way to understand how the world works.
reliability: the consistency of a measurement, such as an intelligence test.
replication: the repetition of a study to confirm the results; essential to the scientific process.
representative sample: a research sample that accurately reflects the population of people one is studying.
research designs: plans of action for how to conduct a scientific study.
samples: subsets of the population studied in a research project.
sampling: the procedure researchers use to obtain participants from a population.
scientific method: the procedures by which scientists conduct research, consisting of six basic processes: observation, prediction, testing, interpretation, communication, and replication (OPTICR).
scientific thinking: a process using the cognitive skills required to generate, test, and revise theories.
self-fulfilling prophecy: a statement that affects events to cause the prediction to become true.
self-reports: written or oral accounts of a person's thoughts, feelings, or actions.
single-blind studies: studies in which participants do not know the experimental condition (group) to which they have been assigned.
social desirability bias: the tendency toward favorable self-presentation that could lead to inaccurate self-reports.
theory: a set of related assumptions from which scientists can make testable predictions.
twin-adoption studies: research into hereditary influence on twins, both identical and fraternal, who were raised apart (adopted) and who were raised together.
validity: the degree to which a test accurately measures what it purports to measure, such as intelligence, and not something else, and the degree to which it predicts real-world outcomes.
variable: a characteristic that changes or "varies," such as age, gender, weight, intelligence, anxiety, and extroversion.

MAKING CONNECTIONS

(Some of the connections are found in the text, while others may be useful for lecture or discussion.)

Common Sense and Logic
CONNECTION: How do psychologists tease apart how much of a trait is due to genetics and how much is due to environment? A common approach is to study twins (both identical and fraternal) who are reared apart or reared together. See "The Relative Effects of Genes and Environment Can Be Teased Apart," in the chapter "The Biology of Behavior."

- **Discussion:** A brief overview of behavioral genetics and personality can be found at: http://www.personalityresearch.org/bg.html. It reviews twin and adoptee research on personality and how behavioral genetics has influenced methodology.

What Is Science?
CONNECTION: Think about one assumption or idea or belief you once had that you no longer believe. What made you change your mind? Did you observe certain things that contradicted your belief, or did someone convince you with the logic of an argument?

- **Discussion:** Ask students to stand up; if they believe research on animals is unethical, have them move to stand on the L side of the room. If they believe that it is ethical, have them stand to the R. If they are unsure, they can stay in the middle. Have the L and R sides discuss their perspective and then ask people to move to the part of the room that now represents their stance. Generally, many students will shift views after discussion, and this will illustrate attitude change (Chapter 14).

CONNECTION: As a neuroscientist working on Parkinson's disease, Helen Mayberg found something unexpected about brain circuitry. Initially she was skeptical. Because she was also curious and open to the evidence, she decided to pursue it further. Her curiosity and openness led to her discovery how placing an electrical stimulator deep inside the brain could turn off depression like a switch (Chapter 16).

- **Suggested Video:** The following link is a case study of a woman who underwent ECT: http://www.youtube.com/watch?v=1JG9eQsjaZY.

The Scientific Method
CONNECTION: Are IQ and personality tests reliable and valid? See "Measuring Intelligence" in the chapter "Language, Thought, and Intelligence." and "How Is Personality Measured?" in the chapter "Personality: The Uniqueness of the Individual."

Descriptive Studies

CONNECTION: The "bystander effect" explains why, when so many people are around, individuals do not get involved and help others in need. When in a group, individual responsibility is diffused among people and everyone thinks that helping is someone else's responsibility (Chapter 14).

- **Suggested Video:** Reenactment of Darley and Latane's research: http://www.youtube.com/watch?v=KE5YwN4NW5o.
- **Suggested Video** (warning, this is violent): A June 5, 2008, hit-and-run in Hartford, CT http://www.youtube.com/watch?v=VEayX8qti1s.

Research Ethics

CONNECTIONS: Social psychologists have demonstrated both in the lab and in the real world that otherwise normal folks can be pressured to do cruel things, such as give people shocks to the point of knocking them unconscious (or so they believe; Chapter 14).

- **Discussion:** Have students discuss how Zimbardo and Milgram's studies might be related to current events (e.g., World War II, Abu Ghraib, cults, hazing).

INNOVATIVE INSTRUCTION

1. Ask the psychology majors in the room what courses they are most and least looking forward to. Generally, they will say they are looking the least forward to Research Methods and Statistics. Then ask them why those classes are required for their major. Use this as a jumping-off point for a discussion about the importance of research in psychology.
2. Ask students what the most famous examples of psychological research they know are. Have them identify the methodology of the studies.
3. Ask students if they believe in UFOs. ESP? You can have a discussion on astrology and see how many of them read their horoscopes.
4. Ask students if they think it is ethical to use deception in psychological research. Why or why not? If not, how can you test issues about cruelty, obedience, stealing, lying, etc.?
5. Ask students if they believe that animal research is ethical. Encourage them to discuss their opinions and challenge each other.
6. Students may have difficulty differentiating theories from hypotheses. Tell them of some different theories you have and ask them to pull out testable hypotheses. For example, you can tell them that a researcher believed that frozen foods do not have calories. Calories are measures of heat. Frozen food, by definition, can't have calories. Therefore, frozen foods are calorie-free. Explain what events this theory might lead to: diets of frozen candy bars, ice cream, Starbucks Frappacinos, frozen cookie dough, and so on, that lead to weight loss. What is the theory? Hypotheses? How can they be tested?

7. Have students get into groups and give them the following theory: media violence and adolescent aggression are related. Assign each group to a different research design (correlation, experiment, survey, case study, and naturalistic observation) and ask them to come up with a testable hypothesis and method of testing.
8. Ask students for the most famous examples of psychological research they are aware of. Have them identify the methodology of the studies.
9. Have students visit the IRB website for your college or university and read over its mission statement. If there is a training certificate researchers must obtain to conduct research on your campus, you may want to have students do so, and report on their experiences.
10. Have students read a great article that expands Rosenthal's research into teacher bias. This can be found in: Rosenthal, R., S. L. Jacobson, L. (1966). Teachers' expectancies: Determinates of pupils' IQ gains. *Psychological Reports*, *19*, 115–118. Have them write two paragraphs that summarize the article and then one paragraph that illustrates a personal experience where they have experienced the bias themselves.
11. Ask students when they may have experienced the self-fulfilling prophecy. Examples include telling themselves they are going to fail a test and then not studying or telling themselves that their significant other's parents won't like them and then acting cold and aloof when they meet.
12. Ask students about their experiences in middle school or high school when they were assigned to "Basic," "Regular," "Advanced," or "AP" classes. How did those assignments change their behaviors? Did the teachers act differently toward them? Why?

Suggested Media

1. *Sybil* (1976) is a great example of a case study.
2. *Kinsey* (2004) is a racy, but good, example of surveys and interviewing techniques. The opening sequence can be shown by going to http://www.youtube.com/watch?v=e19GnyNdC48
3. A great video from Annenberg with Phil Zimbardo, former president of the APA discussing research methods in psychology can be found at: Part 1:, Part 2:, and Part 3 at:
4. *Discovering Psychology: Understanding Research* (Annenberg)
5. McGraw-Hill Psychology Episode III—Insight Into Research Methods https://soundcloud.com/user-250403395/episode-iii-insight-into-research-methods

Concept Clips (McGraw-Hill Connect for Feist and Rosenberg, 5th ed.)

1. Scientific Method
2. Correlation

Suggested Websites

1. The Jane Goodall Institute's homepage: http://www.janegoodall.org/
2. Independent variable practice worksheet: http://dvusd.org/cms/lib07/AZ01901092/Centricity/Domain/4763/variables_worksheet.pdf

Suggested Readings

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Shermer, M. (1997). *Why people believe weird things: Pseudoscience, superstition, and other confusions of our time.* W.H. Freeman.
Zimbardo, P. G. (2007). *The Lucifer effect: Understanding how good people turn evil.* Random House.