

Research Methods

- Which of the following radiological techniques would not allow visualization of changes in the brain while it processes information?
 - CT
 - fMRI
 - PET
 - EEG
- With the new exam, AAMC reduced the emphasis of benchtop synthetic organic chemistry on the MCAT and increased the emphasis on the portion of organic chemistry most relevant in biochemistry. Concerns that achievement in synthetic organic chemistry are only weakly predictive of success in medical school most specifically argue against the old MCAT's
 - face validity
 - criterion validity
 - construct validity
 - content validity
- Which of the following most directly improves the external validity as opposed to the internal validity of an experiment?
 - assignment of subjects to a treatment and control groups by a random procedure
 - random selection of test subjects
 - controls for maturation of test subjects during the course of the experiment
 - retrospective pretesting
- Random assignment in combination with double blind experimental procedure will help address concerns regarding
 - sampling error
 - pre-test effects
 - selection bias
 - reactivity
- Which types of reactivity in experimental procedures may be the result of stereotyping?
 - Rosenthal effect
 - Pygmalian effect
 - Experimenter effect
 - Hawthorne effect
 - I only
 - II, and III
 - I, II and III
 - I, II, III and IV
- For which of the following hypotheses would testing by experimental procedure be nearly impossible?
 - Meditation prior to instruction lengthens attention span.
 - Trauma in early childhood leads to decreased frontal lobe function.
 - Increased consumption of root vegetables alleviates color blindness.
 - Dark clothing decreases the persuasiveness of a person's arguments.
- The following set of four numbers {0,6,8,14} has a mean value of 7. What is the standard deviation of this distribution?
 - 3.0
 - 3.5
 - 5.0
 - 7.0
- What is the median of this distribution?
8, 2, 5, 6, 8, 7
 - 5.0
 - 6.0
 - 6.5
 - 8.0

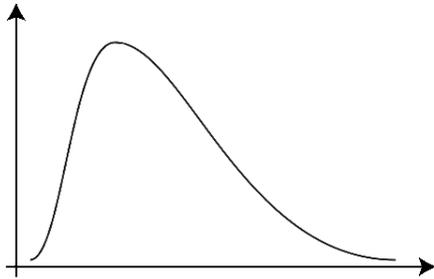
9. In addition to being one of the greatest centers of all time, Shaquille O'Neal was famous for his incredibly low free throw percentage, 52.7% in his career. Wilt Chamberlain had the same problem. If we were to graph the distribution of the free throw percentage of the ten greatest NBA players of all time the graph would be
- Gaussian
 - normal
 - negatively skewed
 - positively skewed
10. Consider a researcher attempting to assess the effectiveness of an over-the-counter analgesic from population data in which drug usage was a patient's choice. Data show that gender differences influence a patient's choice of a particular analgesic as well as their chances of experiencing relief from symptoms. In this scenario, gender is a(n)
- independent variable
 - dependent variable
 - confounding variable
 - control variable
11. Agnes, a volunteer at the animal shelter, hypothesizes that visitors are more likely to adopt a pet when they visit the shelter accompanied by children. She tests her hypothesis by observing visitors for two weeks and recording data. What research method is she using?
- anecdotal evidence
 - naturalistic observation
 - statistical survey
 - field experiment
12. Which of the following is an example of a random sampling method?
- Arranging a list of volunteers in alphabetical order and selecting every 3rd volunteer
 - Using a computer to randomly assign 1/3 of a group of volunteers each to a separate experimental condition
 - Pulling the names of twenty volunteers out of a hat to serve as experimental subjects
 - Dividing a population into smaller groups based on shared characteristics and choosing a sample from each group using a random number generator
- III only
 - III and IV
 - I, II and IV
 - I, II, III and IV
13. To test the effects of a potential molecular targeted therapy on seizure frequency in pediatric epilepsy patients, the Watkins lab first randomly selected a sample of 100 patients and then divided them into a control group and experimental group. However, the original sample was more racially homogeneous than the general population. This may affect the results by introducing a
- bias
 - confounding variable
 - nonsampling error
 - stereotype threat

14. An increase in shark attacks has been observed to coincide with an increase in ice cream sales. This corresponds to
- A. stochastic coincidence
 - B. shark attacks increasing ice cream consumption by an unknown mechanism
 - C. positive correlation between shark attacks and ice cream sales
 - D. a statistically insignificant artefact
15. Which of the following is not a right or practice typically ensured for human research subjects through the ethical guidelines enforced by Institutional Review Boards?
- A. informed consent
 - B. confidentiality
 - C. lack of deception
 - D. post-study debriefing
16. A study is conducted whether people react positively or negatively to a series of images. They use a left-hand clicker for positive, and a right-hand clicker for negative. The tendency for left-handed people to be more inclined to click left and vice-versa is a(n)
- A. positive correlation
 - B. negative correlation
 - C. confounding variable
 - D. extraneous variable
17. A study was conducted at an elementary school to measure whether playing music in the cafeteria during lunch would positively affect afternoon math class assignment productivity. Music was played on Mondays and Tuesdays. On Thursdays and Fridays music was not played. Total number of assignment questions completed were recorded. In this study, the day of the week was
- A. the independent variable
 - B. the dependent variable
 - C. a confounding variable
 - D. an extraneous variable
18. When the observed result obtained by statistical sampling is different than the result specified by the null hypothesis, what is the likelihood of obtaining at least as extreme a result assuming the null hypothesis were actually true?
- A. p -value
 - B. significance level
 - C. confidence level
 - D. confidence interval
19. Bill's score on the psychology & sociology section of the MCAT was one standard deviation above the mean. What was his approximate percentile score on that section?
- A. 57%
 - B. 75%
 - C. 85%
 - D. 95%

20. Many premedical students expressed the belief that the old MCAT (pre-2015) placed too great an emphasis on certain scientific topics, including synthetic bench-top organic chemistry, given current medical school curriculum. The popularity of this opinion decisively argues that the old exam had a problem in terms of its
- A. face validity
 - B. construct validity
 - C. content validity
 - D. concurrent validity
21. The Thematic Apperception Test (TAT) is a type of psychological test in which an individual views ambiguous scenes of people, and is asked to describe various aspects of the scene. For example, the subject may be asked to describe what led up to the scene, the emotions of the characters, and what might happen afterwards. The TAT is an example of a(n)
- A. projective test
 - B. self-report test
 - C. interest test
 - D. direct observation test
22. In order to measure the degree of anger manifested in a subject's response to an experimental treatment, a social-psychology investigator defines the measurement of anger in terms of how loudly the subject speaks compared to his normal tone. Measuring anger in terms of objective empirical data is an example of
- A. multi-dimensional scaling
 - B. psychophysical coding
 - C. subjective coding
 - D. operationalization
23. A large scale study of high school students sought to describe the relationship between television viewing habits and academic success in high school. The study found that self-reported weekly average viewing hours and SAT scores had a correlation coefficient of -0.35 . From this we can conclude that
- A. greater television viewing has a weak tendency to lower SAT scores in high school
 - B. parental restrictions on television viewing for high school students correlates with higher SAT scores
 - C. greater television viewing hours are associated with lower SAT scores
 - D. it is possible for a teenager to watch a great deal of television during their high school years and still score a perfect SAT score
24. Random selection of individuals from two demographically similar communities allowed researchers to compare drinking habits with or without a public health campaign. Which of the following choices best describes the study?
- A. quasi-experiment
 - B. naturalistic observation
 - C. survey
 - D. controlled observation
25. The internal validity of a longitudinal study investigating the effects of aging on various attitudes towards the criminal justice system will have inevitable problems due to which of the following confounding variables?
- A. time-of-testing
 - B. gender of study participants
 - C. demographic shifts of study participants during the study
 - D. personality traits of study participants

26. A study with a significance level of 5% found conclusions with a p -level of 0.04 that a measure of self-esteem was positively correlated (+0.60) with how often people initiate conversations. In other words.
- A. There would be a 4% chance of finding this correlation even if there were no relationship between the two variables.
 - B. The findings were not significant.
 - C. The conclusions have a 95% chance of being correct.
 - D. 60% (+/- 5%) of outgoing people have positive self-esteem.
27. In a balanced placebo design
- A. half of participants receive the active drug and half receive the placebo with neither being told which they are receiving
 - B. half of the participants informed they are receiving the placebo are actually receiving the active drug
 - C. neither the researchers nor the participants are aware which participant is receiving the placebo or the active drug
 - D. groups receive different information of possible side effects of the active drug in a controlled way in order to measure harmful placebo effects
28. Googling the principle investigator, a research subject in a social psychology experiment learns that the researcher often employs deception with subjects. The participant then reveals what they found to other participants in the waiting area. This presents a challenge to the internal validity of the study and may lead to significant
- A. experimenter-expectancy effects
 - B. demand characteristics
 - C. confirmation bias
 - D. Rosenthal effects
29. Cancerous tissue often shows up at bright spots on PET scans because cancerous tissue
- A. tends to have a higher radiographic density compared to normal tissue
 - B. accumulates the fluorescent antibody linked labels used in PET radiography
 - C. tends to have a higher metabolic rate than normal tissue
 - D. has a higher concentration of free radicals compared to normal tissue.
30. Which of the following is an advantage of MRI over CT for brain imaging?
- I. More suited for soft tissue evaluation
 - II. MRI machines do not emit ionizing radiation
 - III. Higher resolution images
 - IV. CT requires contrast agents
- A. I only
 - B. II only
 - C. I and II
 - D. I, II, III, and IV

31. A observational study was conducted in which data was collected. A graph of the data resembles the one shown below:



The data may be described as

- A. positively skewed with a mean higher than the mode
 - B. positively skewed with a mean lower than the mode
 - C. negatively skewed with a mean higher than the mode
 - D. negatively skewed with a mean lower than the mode
32. In many states, school districts employ a screening based on standardized testing to govern invitations to participate in gifted enrichment programs. For example, one particular district invited elementary students possessing a measured IQ of at least 115. Which of the following is most likely to best describe the graph of the distribution of the IQ measurements of students invited to participate within this district?
- A. a Gaussian distribution
 - B. negatively skewed
 - C. sigmoidal
 - D. positively skewed

33. Neurons do not have internal reserves of energy in the form of sugar and oxygen, so their firing causes a need for more energy to be brought in quickly. Through a process called the hemodynamic response, blood releases oxygen to them at a greater rate than to inactive neurons. This causes a change of the relative levels of oxyhemoglobin and deoxyhemoglobin. Detection of these relative levels serves as the basis for which of the following brain imaging methods?

- A. PET
- B. CT
- C. MEG
- D. fMRI

34. EEG is not a first-line method in medicine for the diagnosis of

- A. brain tumor
- B. sleep disorder
- C. epilepsy
- D. coma

35. A survey given to two groups of native Californians show that for this particular population the mean estimate of the total annual number of murders to occur in Chicago exceeds their mean estimate of the number of murders to occur in the state of Illinois. These paradoxical results most likely occurred due to

- A. base rate fallacy
- B. the availability heuristic
- C. illusory correlation
- D. the Hawthorne effect

36. Researcher Jane Goodall pioneered the study of chimpanzees in their natural habitat. The major disadvantage for research findings in this type of study is
- A. it is difficult to generalize the findings
 - B. they have low internal validity
 - C. correlation doesn't imply causation
 - D. experimenter expectancy effects
37. Analyses were performed to determine the relationship between MCAT composite scores and USMLE Step 1 from five graduating classes (2011–2015) at the University of Minnesota Medical School (N=1,065). The multiple linear regression analyses were both significant ($p < 0.001$). The three MCAT component scores together explained 17.7% of the variance in Step 1 scores. What is the value of the correlation between composite MCAT scores and USMLE Step 1 scores?
- A. +0.10
 - B. +0.18
 - C. +0.31
 - D. +0.42
38. Which of the following is a method for research design that minimizes the Hawthorne effect?
- A. double blind procedure
 - B. covert observation
 - C. random selection
 - D. random assignment
39. Which of following measures of central tendency is most sensitive to extreme outliers?
- A. mean
 - B. mode
 - C. median
 - D. standard deviation
40. A researcher sets out to test the hypothesis that meditation practice over time increases scores on a set of specific measures of cognitive performance. She randomly selects fifty first year graduate students from the subject pool and randomly assigns half of them to an experimental group to receive weekly meditation training given by her and half to receive no training. She measures both groups' cognitive performance at the start of the study and again after a two month period. On the basis of her findings, she concludes that "meditation increases cognitive performance." What is wrong with this study?
- I. Risk of experimenter-expectancy effect
 - II. Lack of an independent variable
 - III. No controls for placebo effect
 - IV. Risk of Rosenthal effect
- A. III only
 - B. I and II
 - C. I, III and IV
 - D. I, II, III and IV
41. Which of the following functional brain scanning methods combine good spatial resolution with excellent temporal resolution?
- A. EEG
 - B. PET
 - C. fMRI
 - D. MEG
42. A cumulative final exam in physics only included material from the final two weeks of the semester. The exam did not reflect the overall learning goals and objectives of the course. The exam has low
- A. internal validity
 - B. face validity
 - C. criterion validity
 - D. content validity

43. A bathroom scale consistently measures ten pounds heavy. The measurements of this scale are
- I. reliable
 - II. unreliable
 - III. valid
 - IV. not valid
- A. I only
B. II only
C. I and III
D. I and IV
44. When the null hypothesis is true and you reject it, you make a type I error. When the null hypothesis is false and you fail to reject it, you make a type II error. Which of the following decreases the chance of making a type I error while increasing the chance of making a type II error?
- A. lowering significance level
B. increasing sample size
C. double blind research design
D. random assignment
45. Which of the following is the most effective method to find conclusions within a group of similar studies least contaminated with publication bias?
- A. restrict focus to the largest studies
B. use meta-analysis to derive a pooled estimate
C. select studies with a similar significance level
D. include journal articles where the null hypothesis was confirmed
46. Linear regression analysis was conducted on a large sample of randomly selected ratings data from ratemyprofessor.com. Analysis concluded that 'clarity' was significantly correlated with 'hotness'. This is a likely result of
- A. the leniency effect
B. the error of central tendency
C. the halo effect
D. an illusory correlation
47. Randomly selected participants in a weight loss study were given a choice to participate in either a mediterranean style calorie restricted program or an Atkins style carbohydrate restricted plan. At the end of six months, the average weight loss of the two groups was compared. This study is a
- A. quasi-experiment
B. case study
C. cohort study
D. case-control study
48. Melanie's cumulative MCAT score is in the 97th percentile. What is her approximate z score?
- A. -3.0
B. $+2.0$
C. $+2.5$
D. $+3.0$

49. Double-blind procedures control for which of the following?

- I. Experimenter expectancy
- II. Demand characteristics
- III. Placebo effect
- IV. Hawthorne effect

- A. III only
- B. I and II
- C. I, II and IV
- D. I, II, III and IV

50. A study on social anxiety included a post-study questionnaire in which participants indicated the extent to which they believe that they were aware of the researchers' hypotheses during the research. Significant correlations between the questionnaire results and study data indicate that

- A. experimenter expectancy may have impacted internal validity
- B. an experimental observer shared knowledge with participants about the research hypotheses
- C. demand characteristics may be related to research results
- D. some participants tried to 'beat' the experiment to attain evaluation scores they view as socially desirable