Engineering Psychology and Human Performance 5th edition Wickens Test Bank

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Engineering Psychology & Human Performance

5th Edition

TEST BANK

Christopher D. Wickens, William S. Helton, Justin G. Hollands, and Simon Banbury

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Chapter 2: Research Methods

Multiple Choice Questions

Correct answers are indicated by *

1. What are secondary data?

a. Subjective
b. *Data are not themselves the direct source of data.
c. Data that can not be analyzed by statistical means
d. Confounded

2. A meta-analysis is accomplished by aggregating the _____?

a. *statistical effect size
b. Bayesian statistics
c. degree of evidence
d. statistical interactions

3. A computational model uses the _____?

a. statistical effect size
b. data from questionnaires
c. pooling of data
d. *the output of a formula or a computer simulation

4. An experimental design describes the _____ between an independent and a dependent variable?

a. confounding
b. interaction
c. *conditions used to establish and effect or a causal relation
d. conflict

5. What is a t-test?

a. A technique to analyze trends between two (or more) factors
b. A measure of effect size
c. A method to normalize a data set
d. *A statistical test for the two level comparison

6. A repeated measures design is when _____?

a. the experiment is repeated multiple times
b. *each participant in the experiment receives both conditions.
c. the dependent variable is measured throughout the experiment
d. different participants receive the two conditions

7. What is the benefit of a counterbalanced design?

a. It increases the effect size
b. It makes the data easier to analyze
c. *It averages out the sequential biases when the two groups' performances are averaged

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d. It provides insight into both side of an argument

8. A 2 x 2 four condition experiment is an example of a _____?

a. *factorial design
b. regression
c. computational model
d. meta-analysis

9. What is a statistical interaction?

a. A conflict between the results of two separate statistical analyses
b. Another term for a confounding variable in the dataset
c. The results of a counter-balanced experimental design
d. *The generalizability of an effect of one independent variable across levels of another

10. What is a mixed design?

a. A counter-balanced experimental design
b. An experimental design with more than one hypothesis
c. * One, or some of, the factors are repeated measures and other(s) are between subjects
d. An experimental design that utilizes a combination of qualitative and quantitative measures

11. What is a regression analysis used on?

a. Questionnaire data exclusively
b. *Interval or ratio- scale levels of the independent variable
c. Assumptions on the statistical power of the experimental design
d. The results of a computational model

12. The extent to which people with higher situation awareness also experience higher workload can be analysed using a _____?

a. t-test
b. analysis of variance
c. regression analysis
d. *product moment correlation

13. What is the effort-performance trade-off?

a. The results of a confounding variable in the experimental design
b. The declining performance of participants over the course of an experiment
c. The workload experienced by participants during an experiment
d. *Participants in one condition expend greater effort to increase performance than in another condition

14. What is N?

a. *Sample size
b. Effect size
c. Statistical power
d. How the results of a product moment correlation are expressed

15. What factor does NOT influence the statistical power of an experiment?

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a. Effect size
b*. Participant age
c. Sample size
d. Variability of the data

16. What is ground truth?

a. The state of the world that the researcher believes
b. The state of the world that the academic literature advocates
c. *The state of the world that the researcher wishes to discover
d. The state of the world that the experimental participants believe

17. When does a Type I error occur?

a. When we fail to fully counter balance the experimental design
b. When we detect an effect that does exist
c. When we fail to detect an effect that does, in fact, exist
d. *When we erroneously conclude there is an effect where in fact there is none

18. When does a Type II error occur?

a. *When we fail to detect an effect that does, in fact, exist
b. When we fail to fully counter balance the experimental design
c. When we erroneously conclude there is an effect where in fact there is none
d. When we detect an effect that does exist

19. What is the effect of increasing statistical power?

a. Reduce the range of dependent variables that can be tested
b. *Reduce the probability of a type II error without a corresponding increase in type I error
c. Reduce the number of participants required
d. Increase the applicability of the results to the real-world

20. A meta-analysis is a tool for _____ ?

a. detecting potential confounds in an experimental design
b. debriefing participants after an experiment to gain additional insights
c. analyzing factorial designs
d. * accumulating evidence over a series of experimental studies

21. Analytical equation models often involve _____ ?

a. task analysis
b. *linear algebra
c. statistic tests
d. participant validation

22. A discreate event simulation model _____?

a. drives the presentation of the experimental scenario
b. provides the means by which participants interact with the scenario
c. *runs in real time to simulate a process inferred to operate within the brain.
d. allows the real-time execution of a task analysis

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23. What is the main advantage of a discrete event simulation model?

a. *It can impose the variability on the process that is an inherent feature of human performance
b. It reduces the impact of confounding variables
c. It can automatically generate a meta-analysis
d. It does not require validation

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Chapter 3: Signal Detection and Absolute Judgement

Multiple Choice Questions

Correct answers are indicated by *

1. What is the difference between a signal detection and identification (absolute judgement) task?

a. signal detection typically involves several stimulus states or categories, identification requires only two
b. there is no difference—the two terms are synonyms
* c. identification typically involves several stimulus states or categories, signal detection requires only two
d. signal detection occurs at a later processing stage than identification

2. When is signal detection theory (SDT) applicable?

* a. when there are two discrete states of the world: referred to as signal and noise
b. when there are no discrete states of the world
c. when there are several discrete states of the world
d. when a signal is presented and the user assigns a score to its magnitude

3. Which of the following is not one of the classes of joint events in signal detection theory (SDT)?

a. hit
b. false alarm
* c. false miss
d. correct rejection

4. The quantification of information is influenced by three variables. Which of the following is NOT one of them?

a. the number of possible events that could occur, N
b. their sequential constraints, or the context in which they occur
c. the probabilities of those events
* d. redundancy

5. If 20 signal trials and 10 noise trials were presented and there were 2 hits and 18 misses, which of the following is the correct hit rate?

* a. 2/20 = .1
b. 18/20 = .9
c. 2/30 = .066
d. 18/30 = .60

6. Can the value of evidence variable X ever exceed the criterion X_C?

a. only when a signal is presented
b. only when noise is presented
* c. when either signal or noise is presented
d. no, X_C can never exceed evidence variable X

7. In SDT we represent signal and noise as a pair of distributions. Which of the following is a true statement concerning these distributions:

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* a. there is always some overlap between the distributions and the distributions are normal
b. there is no overlap between the distributions and the distributions are normal
c. there is always some overlap between the distributions are the distributions are not normal
d. there is no overlap between the distributions and the distributions are normal

8. In SDT we represent signal and noise as a pair of distributions. Which of the following describes conservative responding?

a. X_C is placed to the left of where the distributions meet
* b. the observer says "no" (signal absent) much more often than she says "yes" (signal present)
c. the observer says "yes" (signal present) much more often than he says "no" (signal absent)
d. X_C is placed where the distributions meet

9. The _____ the difference between signals and noise, the greater these error probabilities become because the amount of variation in *X* resulting from randomness increases relative to the amount of energy in the signal.

* a. smaller
b. bigger
c. more improbable
d. none of the above

10. Which of the following defines β_{opt} in response to changes in signal probability?

* a. P(N) / P(S)
b. P(S) * P(N)
c. P(S) / P(N)
d. 2 * P(N) + ½

11. Optimal beta can be defined in terms of payoffs (costs and values). Which of the following should increase optimal beta?

* a. an increase in the value of a correct rejection
b. an increase in the value of a hit
c. an increase in the cost of a miss
d. a decrease in the cost of a false alarm

12. Sluggish beta refers to:

a. the optimal value of beta does not change with payoffs
b. empirical beta values are affected by probabilities
* c. as optimal beta is adjusted by probabilities or payoffs, there is a smaller shift in empirical beta values than is necessary
d. as optimal beta is adjusted by probabilities or payoffs, there is a larger shift in empirical beta values than is necessary

13. Which of the following statements about sluggish beta is false?

a. sluggish beta is more evident for probabilities than payoffs
b. sluggish beta is not related to an observer's sensitivity
* c. sluggish beta is a laboratory phenomenon and does not occur in the real world
d. sluggish beta means that people cannot adjust their criterion in an optimal manner

14. A key contribution of signal detection theory is that it:

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a. predicts the response criterion for a particular individual
b. predicts the sensitivity for a particular observer in a particular context
* c. makes a clear distinction between response bias and sensitivity
d. shows that sensitivity is less important than response bias

15. A Receiver Operating Characteristic (ROC) curve plots:

a. hits against misses
b. hits against misses plus false alarms
c. false alarms against correct rejections plus hits
* d. hits against false alarms

16. How many points on the ROC can be generated from a 2 x 2 response matrix?

* a. one
b. two
c. four
d. eight

17. Points along a single ROC curve have the same:

a. bias
* b. sensitivity
c. sensitivity and bias
d. false alarm rate

18. Confidence levels is a:

* a. useful method in shifting the criterion to an optimal level.
b. way to demonstrate risky beta setting
c. method for determining which observers are more confident in their judgments
d. better way to measure sensitivity

19. A point on the positive diagonal on an ROC curve indicates which of the following:

a. extremely high sensitivity
b. a low criterion setting
* c. chance responding; i.e., zero sensitivity)
d. optimal beta

20. What happens when an ROC curve is plotted using z-scores?

* a. the ROC curve becomes a straight line
b. the ROC curve becomes more shallow
c. the ROC curve becomes straight and shallow
d. the ROC curve cannot be represented using z-scores

21. What does d' represent?

a. response bias
b. a non-parametric measure of bias
* c. sensitivity
d. accuracy

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22. What does A' represent?

a. a non-parametric measure of response bias
b. a parametric measure of sensitivity
c. bias divided by sensitivity
* d. a non-parametric measure of sensitivity

23. As more dimensions are added, more total information is transmitted, but less information is transmitted per dimension.

a. integral dimensions
* b. orthogonal dimensions
c. configural dimensions
d. correlated dimensions

24. As more dimensions are added, the security of the channel improves, but Hs limits the amount of information that can be transmitted.

a. integral dimensions
b. orthogonal dimensions
* c. correlated dimensions
d. configural dimensions

25. Some dimensional pairs, particularly those spatial dimensions like the height and width of a rectangle _____ when they are combined (Garner, 1976).

a. collied
b. integrate
* c. configure
d. separate

26. When human operators transmit information along all dimensions of a two-dimensional (or more) stimulus, they must _____ between the dimensions. When they are asked to process one dimension and ignore changes on the others, they are _____.

a. separate, dividing attention
* b. divide attention, focusing attention
c. choose, focusing attention
d. divide attention, selecting

27. A study described by Swets (1998) indicated that radiologists provided with a "reading aid" (checklist of features and a response scale) were better able to distinguish a cancerous tumor from a benign cyst than radiologists without the aid. In SDT terms, this means the radiologists _____.

a. with the reading aid were more conservative than those without
b. with the reading aid were more liberal than those without
c. without the reading aid were more influenced by disease prevalence than those who used the aid
* d. with the reading aid showed greater sensitivity than those without

28. A physician has to weigh the value of human life against financial and other costs when making medical decisions. Rather than consider the values of hits and correct rejections and the costs of misses and false alarms, Swets suggested that physicians:

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a. ignore the costs
* b. develop a ratio of benefits and costs in the form of a statement
c. weight the values twice as much as the costs
d. ignore the costs and values and go with a gut judgment

29. Which of the following approaches to eyewitness identification tends to reduce false alarms?

a. a sequential lineup
b. a simultaneous lineup
* c. information the witness that the suspect might not be in the lineup
d. post-identification suggestions

30. What is the main reason that alarm and alert systems have a low beta setting?

a. to avoid the "cry-wolf effect"
* b. The cost of misses is typically greater than the cost of false alarms
c. the base rate of dangerous events is high
d. it is an inherent characteristic of automated detection systems

31. Which of the following is not a solution to the mistrust caused by alarm false alarms?

a. use multiple alarm levels
b. keep the human in the loop
c. improve operator understanding of alarm false alarm rates
* d. lower automated beta slightly

32. In the experiment by Mackworth (1948), a pointer moved in small jumps around a clock face. At intermittent intervals a target event occurred (a double jump of the pointer). What was the key result?

a. the target event was detected
b. the target event was not detected
c. it became easier to detect the target event over time
* d. it became harder to detect the target event over time

33. The vigilance decrement is a result of:

a. a decrease in sensitivity
b. a decrease in the response criterion (more liberal)
c. an increase in the response criterion (more conservative)
* d. both a decrease in sensitivity and an increase in the response criterion (more conservative)

34. Sensitivity in a vigilance task is higher when:

a. a target's signal strength is reduced
b. there is uncertainty about time or location of the signal
* c. targets and non-targets are presented simultaneously (rather than successively)
d. the event rate is increased

35. Which of the following theories accounts for the observed shift in the response criterion over the course of a vigil?

a. arousal theory
b. expectancy theory
c. sustained demand theory

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* d. arousal theory and expectancy theory

36. Which of the following theories accounts for the sensitivity decrement over the course of a vigil?

a. arousal theory
b. expectancy theory
* c. sustained demand theory
d. arousal theory and expectancy theory

37. Sensitivity in a vigilance task can be improved by:

a. requiring the inspector to remember the target stimulus
b. decreasing target salience
c. increasing the event rate
* d. decreasing the event rate

38. Which of the following is NOT an effective method for shifting the response criterion downward towards an optimal level:

a. introducing false signals
b. providing feedback to the inspector (knowledge of results)
* c. training the observer to produce automating processing of the target
d. instructions about the costs of misses

39. Which of the following does NOT occur in an absolute judgment task?

a. multiple stimuli are presented
b. the subject gives its stimuli its name
c. the stimuli lie along some continuum (e.g., different brightnesses)
* d. the stimuli are presented in systematic order (e.g., from dimmest to brightest)

40. What is the limit of human performance in an absolute judgment task, in terms of information transmitted (HT)

* a. 2-3 bits
b. 2-3 stimulus levels
c. 7 plus or minus 2 bits
d. there is no limit

41. What are the implications of the bow effect for human absolute judgment?

* a. stimuli in the middle of a range are more likely to be misclassified
b. stimuli at the ends of a range are more likely to be misclassified
c. stimuli at the high end of the range are more likely to be misclassified
d. stimuli at the low to middle range are most likely to be misclassified

42. Which of the following pairs of dimensions are most likely to be orthogonal?

* a. weight and hair color
b. weight and height
c. weight and gender
d. height and gender

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43. As dimensions are combined orthogonally, what happens to human information transmission (i.e., total H_T)?

a. it increases with the number of combined dimensions
b. it matches perfect performance
c. the number of bits per added dimension decreases
* d. it increases with the number of combined dimensions and the number of bits per added dimension decreases

44. As dimensions are combined redundantly (e.g., traffic light), what happens to human information transmission?

* a. it increases but is limited by the total amount of information in the stimulus
b. it increases with each increase in the number of combined dimensions
c. it decreases
d. it decreases but H_{loss} increases

45. When humans must identify or classify three or more stimuli at different levels along a sensory continuum, a task called **absolute judgment**, we find that performance is relatively ____ even when there may be substantial physical _____ between the levels

* a. poor, differences
b. better, similarities
c. poor, similarities
d. better, differences

46. In a graph demonstrating typical human performance in absolute judgment tasks, the level of the flat part or asymptote of the function indicates ____.

a. the maximum amount of information in the stimulus
b. the minimum of information transmitted.
c. the experimental results
* d. the channel capacity of the operator

47. SDT concepts are highly applicable to many engineering psychology problems (Fisher, Schweickert, & Drury, 2006). What are the two general benefits?

a. provides a diagnostic tool that implies different corrective actions
b. provides the operator with the ability to focus attention on one dimension
c. provides the ability to compare sensitivity and quality of performance
* d. a and c
e. b and c
f. a and b

48. Which of the following is an area of application of SDT?

a. medical diagnosis
b. eyewitness testimony
c. alarm design
* d. all of the above

49. Which of the following results describes configural dimensions?

a. the size of rectangles does not affect classification of their color

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