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?

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

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

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:

* 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: