Name: _____ **Date:** _____

Answer Key: When Hypotheses Fail Advanced College Quiz

Can you distinguish between post-hoc rationalization and legitimate theory revision? Analyze the epistemological boundaries of falsifiability and rigorous experimental design.

---

1. In a double-blind longitudinal study investigating the efficacy of a new neuroplasticity drug, the 'Penta-Influence' effect occurs when researchers inadvertently signal expectations through micro-expressions. This phenomenon primarily threatens which aspect of the scientific method?

Answer: B) Internal validity via investigator bias

Investigator bias, even at a subconscious level, introduces a confounding variable that obscures the causal relationship between the independent and dependent variables, thus compromising internal validity.

2. According to Karl Popper's principle of demarcation, a theory that cannot be falsified by any conceivable empirical event is considered scientifically superior because of its absolute resilience.

Answer: B) False

Popper argued that falsifiability is the hallmark of science; if a theory cannot be proven wrong, it is pseudoscientific because it makes no specific, testable predictions.

3. When a researcher observes a correlation between two variables and assumes causation without accounting for a third, unmeasured variable, they have fallen victim to the .

Answer: C) Third-variable problem

The third-variable problem occurs when an extraneous factor (confounder) is actually responsible for the observed relationship between the two study variables.

4. A team of astrophysicists detects an anomaly in galactic rotation curves that contradicts current Newtonian models. Instead of discarding the model, they propose the existence of 'Dark Matter.' This move is an example of:

Answer: A) Ad hoc hypothesis modification

Ad hoc hypotheses are additions to a theory intended to save it from being falsified by anomalous observations, requiring further independent testing to be scientifically valid.

5. In the context of the Replication Crisis in social sciences, the practice of selectively reporting only significant results while ignoring non-significant ones is known as .

Name: _____ **Date:** _____

Answer: B) The file drawer effect

The file drawer effect leads to a literature bias where published studies suggest an effect exists simply because the studies showing no effect were never published.

6. A 'Type I Error' occurs when a researcher fails to reject a null hypothesis that is actually false, essentially missing a real discovery.

Answer: B) False

This describes a Type II Error (false negative). A Type I Error is a 'false positive,' where the researcher rejects a true null hypothesis.

7. Thomas Kuhn's 'The Structure of Scientific Revolutions' suggests that most scientific work occurs within a 'normal science' phase. What triggers a 'Paradigm Shift'?

Answer: B) The accumulation of anomalies that the current paradigm cannot explain

Kuhn argues that when anomalies become too numerous for the prevailing framework to resolve, a crisis occurs, eventually leading to a paradigm shift.

8. A sequence of reasoning that moves from specific observations to a generalized conclusion, often used in generating hypotheses, is called .

Answer: C) Inductive reasoning

Inductive reasoning takes specific instances and expands them into broader generalizations, whereas deductive reasoning flows from the general to the specific.

9. In a truly controlled experiment, every single variable except for the independent and dependent variables must be kept constant to isolate the causal effect.

Answer: A) True

Control variables are essential to eliminate alternative explanations (confounds). Without consistent controls, the researcher cannot be certain which variable caused the change.

10. A pharmaceutical study finds a p-value of 0.049. While statistically significant at the alpha = 0.05 level, what does this actually signify regarding the 'truth' of the hypothesis?

Answer: C) There is a 4.9% probability of observing these results if the null hypothesis is true

Name: _____ **Date:** _____

A p-value measures the probability of the data given the null hypothesis; it is not a direct measure of the probability that the hypothesis itself is true or false.