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Questions about "Bias" in *Science Fictions*

Q1. What does it mean when the result of en experiment has a p-value smaller than 1%?

When the result of an experiment has a p-value smaller than 1%, it means there is less than a 1% probability that the observed results occurred by chance if the null hypothesis were true. This suggests strong evidence against the null hypothesis (favoring the alternative hypothesis), indicating that the effect observed in the experiment is statistically significant and unlikely to be a result of random variation.

Q2. What is "publication bias"?

This refers to the tendency for journals to preferentially publish positive or significant findings over non-significant or negative ones. This leads to a disproportionate number of successful studies being published, while studies that do not find significant effects are less likely to see the light of day. As a result creating a misleading representation of the research field.

Q3. What did Morton try to prove by packing seeds into the skulls of white men?

Morton attempted to prove that the skulls of white men were more capacious compared to those of Asian, Native American, and African people by packing seeds (and later, lead shot) into their skull cavities. He inferred the brain size from the volume of seeds or pellets he could fit inside, concluding that the larger capacity indicated superior mental and moral faculties among white populations. This was part of Morton's broader effort to argue for the inherent superiority of white people and play a key role in the development of scientific racism.

Q4. Why is it important to report the number of unsuccessful experiments?

Reporting the number of unsuccessful experiments is crucial because it provides a complete and accurate picture of the research conducted, preventing publication bias. Publication bias occurs when only positive or successful results are published, while null or negative outcomes are overlooked or discarded. This bias can distort the scientific literature, making it appear as if there is more support for certain hypotheses than actually exists.

Q5. Suppose 1000 experiments are conducted, and that the Null hypothesis is true. How many experiments would you expect to pass the 5% significance threshold (assuming everything is done correctly)?

If 1000 experiments are conducted and the null hypothesis is true for all of them, we would expect about 5% of these experiments to pass the 5% significance threshold purely by chance. This is because a p-value of 0.05 indicates that there is a 5% probability of observing a result at least as extreme as the one obtained, assuming that the null hypothesis is true. Therefore, for 1000 experiments where the null hypothesis is true, we would expect: 1000 experiments * 5% = 50 experiments

Q6. What is the problem with choosing the statistical test after the experiment is done and the results are available?

Choosing the statistical test after the experiment is done and the results are available, as discussed in the text, can lead to a practice known as "p-hacking." This involves selectively choosing statistical methods that yield significant p-values (below the conventional threshold of 0.05) by exploiting the flexibility in data analysis. This practice increases the likelihood of finding statistically significant results by chance, which can result in false-positive findings.