

Question 1: Define replication and the decline effect. Discuss their importance.

Replication refers to the practice of recreating the conditions of an experiment (and the steps followed), using different test subjects, in an effort to confirm the results of previous trials of the experiment. Called “the foundation of modern research” in paragraph three, replication can be used to confirm a new drug’s effectiveness. In the scientific research process, replication is used to correct the naturally occurring error amongst researchers of noticing and accepting results that they hypothesized. Because of this tendency, researchers may inadvertently ignore/manipulate data to confirm their preconceived expectations for the outcome of an experiment. Replication serves to eliminate this “flaw”; the scientific community can step in and try to confirm the results of the experiment by replicating it (Paragraph 3).

Joseph Rhine performed an experiment to test the existence of extrasensory perception, or ESP. In this experiment, one subject showed the possibility of having ESP. (Paragraph 13). However, when Rhine tried to replicate the experiment he found that the test subject’s supposed ESP had seemingly vanished. Rhine was the first to call this the “decline effect”; the disappearance of statistical evidence supporting a scientific claim (that ESP existed, in Rhine’s case). Since Rhine named this phenomenon, researchers have noticed how consistently the decline effect occurs. Its reoccurrence suggests a flaw in the scientific research process; that bias may cause data to be accepted because it confirms the hypothesis. The decline effect serves as an important reminder that an experiment never proves truth (Paragraph 38).

Question 2: Describe one potential explanation for the decline effect.

A potential explanation for the decline effect is that initial sample sizes may be small and/or contain outliers that skew and indicate a groundbreaking outcome. When the experiment is replicated later, the total number of subjects sampled increases, which leads to regression towards the mean (Paragraph 16). However, this doesn’t explain why the results seem to decline in a linear fashion; a fluctuation would be expected to occur with randomization. Jonathan Schooler’s experiments finding “verbal overshadowing” (Paragraph 6) support this regression towards the mean. Initially, Schooler’s experiments indicated a large amount of “verbal overshadowing”. After extended replication, Schooler noticed less and less among his subjects. Schooler eventually concluded in paragraph 8 that “his initial batch of research subjects must have been unusually susceptible to verbal overshadowing,” or that his initial batch had outliers.

Question 3: Advantages/Disadvantages of an Open-Source Database

An advantage of researches sharing their data via open-source database would be that experiment quality would be more readily subject to evaluation, meaning that overall researchers would increase experiment quality to maintain a reputable image. A disadvantage of sharing data this way would be an increase in time spent preparing for an experiment, only to have the same outcome anyways. Experimenters would need to spend time uploading intentions and results to this database, but in the end replication would need to occur to reinforce the original conclusion, no matter how legitimate the experiment seems.

To combat the decline effect, I would highly recommend increasing sample size to at least thirty for all experiments, as statistically a sample size of at least thirty has been proven to show an approximately normal distribution that accurately reflects the true population distribution. A large enough sample size will incorporate regression to the mean. Perhaps by obtaining a statistically significant mean that is close to the true mean, we will see a decline in the occurrence of the decline effect.