

Type 1 and type 2 errors

You are learning about...	You are learning how to...
Statistical errors in psychological research	Use and interpret inferential statistics

A type 1 error

Fakedata & Fraud wanted to investigate the effect of Terry Wogan on memory. They selected forty one-syllable concrete nouns from a school dictionary. These words were randomly divided into two lists of twenty words each. Fakedata & Fraud recruited a group of student participants from their university. Each participant was tested individually. They sat watching a screen on which the first word list was projected, one word at a time. Each word was visible for 1.5 seconds, with a 1 second gap between words. After the word list had finished the screen went blank and the participant was instructed to say aloud as many of the words as they could recall. This procedure was repeated for the second wordlist. Immediately prior to recall phase of the procedure, a picture of Terry Wogan was displayed on the screen, and the participants heard a 5 second recording in which Terry Wogan's voice encouraged them to try especially hard to remember the words. Recall scores for the two conditions were compared. The researchers set their criterion for significance at 1 tailed $p \leq 0.05$.

1. Why were the words randomly allocated to the two lists?
2. Which experimental design was used, and what mistake did the researchers make in employing it?
3. What would be an appropriate statistical test to analyse the data and why?
4. Fakedata & Fraud did not find a significant result. They were disappointed by this, so they did the experiment a few more times just to make sure. On the twentieth run-through, the result was significant. Were they now justified in concluding that Terry Wogan does affect memory processes?

A type 2 error

Fakedata and Fraud carried out an observational study on the defecatory habits of American black bear (*Ursus Americanus*). They were specifically interested in whether the bears confined their bowel movements to particular terrain types. The bears were observed in the enclosure of a local zoo where they were kept. The large enclosure had a number of terrain areas including a heavily treed patch which the researchers designated 'the woods'. The remainder of the enclosure was designated 'not the woods'. Over a period of five days, the bears were watched carefully by two researchers. Whenever a bear defecated the researchers recorded carefully the time at which this took place and whether it had happened in 'the woods' or not. Because they wanted to be particularly confident in their conclusions, Fakedata & Fraud set a criterion of 2 tailed $p \leq 0.001$ for rejecting the null hypothesis.

1. Why were two researchers used?
2. The bears were in captivity. Does this mean that the investigation cannot be considered a naturalistic observation?
3. It was found that the bears were 'in the woods' at the time of 79% of their defecations. The researchers used a statistical programme to calculate that the probability that result occurred by chance was 0.006. Because this did not meet their criterion for significance they accepted the null hypothesis. Were they right to conclude that bears do not choose particular terrain types to defecate in?