

P-values, False Discovery Rates and Family-wise Error Rate

After this module you should be able to explain the following terms and ideas.

KEY TERMS

Test statistic, random variable, null distribution, extreme, p-value, empirical null, assumed null, normal distribution, alternative hypothesis, significance threshold, FDR, FWER, Type I error

CONCEPT QUESTIONS

Why does the p-value tell you nothing about the alternative hypothesis?

When is it not necessarily a bad idea to use a significance threshold of 0.05?

If you do 100 independent tests where the truth is everything is null and you use a threshold of 0.05, what is your expected FDR? FWER?

One hundred undergraduates do “psychology studies” as part of their degrees. In each of their studies they do one test and they each use a significance threshold of 0.05. Nine of the students submit their results showing a “significant result”. How many of those nine significant results do you expect to be true positives? How many false positives?

You asked the psychology students in the above question who had significant results to repeat their studies without using any of the same study subjects. How many of the nine students above do you expect to “replicate” their significant results? How many will not replicate their results?

When must you sample to determine an empirical null distribution?

When is it appropriate to use an assumed null distribution?

