

PSY 626: Bayesian Statistics in Psychology
Homework 1: P-Hacking and Testing for Excess Success
Due: Monday 22 January at 5 pm

Note: You may want to read these instructions entirely before completing each step.

1. Use an online app to create and p-hack 5 data sets.
 - a. Design a plausible experiment to investigate some phenomenon that interests you. (Note: You will not be graded on how well the experiment is designed.) This experiment must have the following:
 - i. a control group,
 - ii. an experimental group,
 - iii. an initial number of participants in each group, and
 - iv. at least three dependent variables
 - b. Given the experiment you designed in Step 1a, use the app at the following link to create a simulated data set for this experiment and p-hack it. Assume that Cohen's d is zero. To simplify Step 3 below, generate a result with only one significant outcome. shinyapps.org/apps/p-hacker/
 - c. Repeat Step 1b four more times and, thus, produce a total of 5 p-hacked data sets. Be sure to always have Cohen's d set to zero.
2. Write up what you did in Step 1 supposing that you are up for tenure and want to get your study published in some prestigious journal. This should be written from the perspective of someone who is either ignorant about the dangers of p-hacking or nefarious, i.e., write this under the pretense that you did not p-hack the data to produce the significant results. This write up can take the form of a journal article with the following sections: Introduction, Method, Results, Discussion, and Conclusion. The write up can be brief, but be sure to:
 - a. explain the experiment (indicating what the control group, experimental group and dependent variables are),
 - b. report the relevant significant data analysis results, and
 - c. interpret and explain the pattern of results obtained in a coherent manner given the experiment you designed and phenomenon you set out to investigate.
3. Apply the Test for Excess Success to the brief 'manuscript' you wrote in Step 2. Do your calculations using R, and be sure to save your code in an R script. It may be useful to consult the papers posted for Lectures 1,2,3, on the class web site. Additionally, you may find it useful to use R code I created in *ComputePower.R*, which is available on the class web site. (Using this code is much easier than other calculators that you might find on-line.)
4. Write up what you did in Step 1b and Step 3:
 - a. Describe how you p-hacked the data to produce a significant effect, i.e., describe what you did in Step 1b to generate a result with a significant outcome.

- b. Describe what you did in Step 3, i.e., describe how you applied the Test for Excess Success to the p-hacked data sets.
 - c. Create a table for your Excess Success analysis similar to those we have seen during the first two weeks of class, i.e., list at least:
 - i. the statistical results,
 - ii. power values, and
 - iii. the product of power values.
 - d. Discuss the results of your Test for Excess Success with reference to: your experiment, the conclusions you drew from the data in Step 2, and how you p-hacked the data. What is your main conclusion in view of this discussion?
5. Send the write ups from Step 2 and Step 4 (These can be combined in a single document.) and the R script for Step 3 via email to: dlarran@purdue.edu