

# PSYC 5301: Research Methods

Tarleton State University

Homework 7

Note: the data files for the problems below are `data2.csv` and `data3.csv`, respectively, from the Unit 6 homework assignment.

1. An education researcher wants to determine whether children whose preschool classroom has a window differ in their vocabulary acquisition as compared to children whose classroom does not have a window. At the beginning of the school year, 10 children were randomly assigned to one of two different classrooms: Classroom 1, which had a window, and Classroom 2, which had no window. All children were given a standardized vocabulary test as a pretest. At the end of the school year, each child's vocabulary was tested again.

Perform a Bayesian ANCOVA testing the impact of classroom type on posttest scores, with pretest scores as a covariate. Write up the results using the format given in lecture, being sure to include the following elements:

- (a) a description of the analysis performed
  - (b) a list of potential models
  - (c) the models which increased their model odds after observing data
  - (d) a report of the model with highest posterior probability
  - (e) a comparison of this model (i.e.,  $BF_{10}$ ) against the next best fitting model
  - (f) the inclusion (or exclusion) Bayes factors for each predictor
  - (g) an estimate (with 95% credible interval) of the covariate effect.
2. Psychologists have investigated under what conditions recalling negative emotions can be helpful as opposed to harmful. One hundred fifty-five subjects were asked to recall an interpersonal experience in which they felt overwhelming anger and hostility, and were randomly assigned to one of four conditions instructing them to adopt a perspective combining a type of self-perspective (self-immersed vs. self-distanced) and type of emotional focus (what vs. why). In the self-immersed perspective, subjects were told to "relive the situation as if it were happening to you all over again," whereas in the self-distanced perspective they were to move away from their experience and watch it unfold from a distance. Subjects were to then focus on either the specific feelings they were experiencing (*what* focus) or on the reasons underlying their feelings (*why* focus). The dependent variable was a measure of implicit anger, a performance measure indexed by how many of seven target word fragments were completed as anger words rather than neutral words. Subjects also rated their emotional closeness to the other person in their experience on a 7-point scale. The investigators treated this as a single-factor design with four treatment groups: Group 1 = immersed/what; Group 2 = immersed/why; Group 3 = distanced/what; Group 4 = distanced/why.
    - (a) Perform a Bayesian ANCOVA testing the impact of treatment group on anger scores, with emotional closeness scores as a covariate. Write up the results using the format given in lecture, being sure to include the following elements:
      - i. a description of the analysis performed
      - ii. a list of potential models
      - iii. the models which increased their model odds after observing data
      - iv. a report of the model with highest posterior probability
      - v. a comparison of this model (i.e.,  $BF_{10}$ ) against the next best fitting model

- vi. the inclusion (or exclusion) Bayes factors for each predictor
  - vii. an estimate (with 95% credible interval) of the covariate effect.
- (b) In the Unit 6 homework, you found a “statistically significant” effect of treatment group with  $p = 0.037$ . After doing the Bayesian analysis here, do you still believe that treatment group impacts anger scores? Explain.