Bayesian Statistics

1. In this exercise, you are going to use the Big Five Personality Traits dataset in JASP to perform a Bayesian correlation.

   (a) Construct a scatterplot showing the relationship between Openness and Agreeableness. What do you notice?

   (b) What is the default prior used by JASP for the Bayesian correlation test? What does it imply for our prior belief about the (population) correlation coefficient ρ?

   (c) Select "Prior and posterior" in the "Plot Individual Pairs" menu. Which model ($\mathcal{H}_1$ or $\mathcal{H}_0$) best predicts the observed correlation? How do you know?

   (d) Report the median posterior value and 95% credible interval for ρ.

   (e) Suppose you include this analysis in a paper you are trying to publish. A reviewer comments "I reject your Bayesian analysis, because the results depend too much on the choice of prior." How do you respond?

2. In this exercise, you are going to use a great tool for doing secondary Bayesian analyses on published results. It is called the "Summary Statistics" module, and is accessible from the list of add-on modules in JASP. Suppose you are reading a published paper and see that the authors obtain a sample of size 175 and finds a "significant" correlation of $r = 0.15$, $p = 0.048$.

   (a) Open the "Summary Statistics" module, select "Bayesian correlation", and input this sample size and observed correlation in the module. You'll immediately get both a p-value and a Bayes factor.

   (b) Interpret this result as you would in classical inference (i.e., based on the p-value). Which model ($\mathcal{H}_0$ or $\mathcal{H}_1$ is supported) by this result?

   (c) Interpret this result as you would in Bayesian inference (i.e., based on the Bayes factor). Which model is supported from this analysis?

   (d) What do you think is going on here? (Hint: google "Lindley's paradox")