Psych 205
Assignment 9
Due April 20th at 9:00am

In this assignment, we are going to be analyzing a dataset of IQ (Ravens) data that my lab gathered in an online testing paradigm (We were interested in quantifying effort in IQ tests as an important confound in actual IQ testing).

Q1 [SOLO, 15pts] The primary thing we will be interested in for this assignment is the "item" column and RT. This IQ test has items that get harder for higher item numbers. (a) If items get harder, what should we predict about RT and accuracy as item number increases? (b) Load the data, check RT for outliers, and (c) do something to handle them if you find any.

Q2 [SOLO, 15pts] Plot the effect of item on RT in a publication-quality plot. Use color to show which were answered correctly, facet by subject, and include a linear regression line for each subject. (NOTE that if you specify color, ggplot may try to make it a group and add two regression lines; you can override this by specifying a constant "group" like group=1 in aes).

Q3 [HELP, 10pts] What do you see in the data there? Are there any subjects who should be removed and why (not just response outliers as in Q1, but entire subjects)? Remember that this is data from an online experiment where many subjects may not pay attention or care to do well on the task. Can you spot any? Come up with a criterion for subjects who aren't trying at all, and remove them (remove them with code, NOT with a list by hand or by editing the spreadsheet). List the subjects you removed.

Q4 [HELP 25pts] Run a model predicting RT from item and correct, and include random slopes and intercepts by subject. When you do this, you may get a "failure to converge" error due to limitations in lmer's numerical methods, and you should be able to pass *control=lmerControl(optimizer ="Nelder_Mead")* to lmer to make it work (this changes the method lmer uses in parameter fitting). (a) Print a summary and write 2-3 sentences like you might find in a real paper to explain whether or not it is true that subjects overall spend more time on later questions. (b) Compare the coefficients from lmer to a simple lm without subject effects and explain any differences or similarities you see.

Q5 [HELP 15pts] If l is a regression ranef(l)$subject will give you the slope and intercept adjustments for each subject. (a) What is the mean of the item slope adjustments in your regression and why does it have this value? (b) How many subjects here have fit slopes which are positive vs. negative? (Remember ranef doesn't give the slope, it gives the adjustment to the slope) (c) Make a scatter plot of the slope and intercept adjustments for each subject. (d) Are they correlated or uncorrelated? Explain why, intuitively, and describe what the correlation means.