

ASSIGNMENT #7

EPsy 8252

This assignment is intended to give you experience in using the `lmer()` function for fitting multi-level regression models. You will use the two datasets *popularLevel1.csv*, and *popularLevel2.csv*, which come from Hox (2002). The codebook for these data is also available. You will use the data to examine predictors of students' popularity, which is the average popularity of a student as rated by his/her classmates. Since the sociometric procedure used to assign a popularity measure asked all pupils in a class to rate all the other pupils, and then assigned the average popularity rating to each pupil, there are likely classroom-level effects. To deal with this, the models you will fit in this assignment will need to account for the within-class variation by including a class-level random effect.

Please submit your responses to each of the questions below in a printed document. There are 15 points possible for the assignment. Each question is worth one point unless otherwise noted. Please adhere to the following guidelines for formatting your assignment:

- All graphics should be resized so that they do not take up more room than necessary and all should have an appropriate caption.
- Any typed mathematics (equations, matrices, vectors, etc.) should be appropriately typeset within the document using Equation Editor, Markdown, or \LaTeX .
- All syntax included should be typeset in a monospaced font, appropriately commented and follow the Data Camp Style Guide (<https://teach.datacamp.com/style-guide>).

PREPARATION

To begin the assignment, you will need to merge the *popularLevel2* data into the *popularLevel1* data. This should result in a data frame with 2000 rows and 7 variables.

LMER I

To begin the analysis, you will fit the intercept-only model with a random-effect of intercept. This will provide a benchmark for any subsequent models that you fit. You can label this section as "LMER I" in your word-processed document.

1. Using symbolic notation, including variable names where appropriate, write the equations for the multi-level model.
2. Compute and interpret the value of the intraclass correlation.

LMER II

Fit a model that includes the random effects of gender and level of extraversion (and intercept) to explain variation in popularity. Answer the following questions. You can label this section as “LMER II” in your Markdown document.

3. Using symbolic notation, including variable names where appropriate, write the equations for the multi-level model.
4. Consider the Random effects table in the output. Explain each of the numbers in the Variance column (i.e., interpret the values). **(2pts)**
5. Based on the estimated values, explain why there is evidence that the random effect for female does not belong in the model.
6. Provide an appropriate interpretation of the fixed effect estimate in the extra row.
7. Provide an appropriate interpretation of the fixed effect estimate in the female row.
8. Based on the estimated values, compute a 95% confidence interval for the fixed effect of extra.

LMER III

Add the Level-2 predictor of teacher experience to the model fitted in the LMER II section. Answer the following questions. You can label this section as “LMER III” in your Markdown document.

9. Using symbolic notation, including variable names where appropriate, write the equations for the multi-level model.
10. If this model were adopted, which of the five fixed effect estimates should be interpreted? Explain.

Summary Table of the Fitted Models and Model Comparison

Find a journal article that presents results from an analysis that used multi-level models (i.e., HLM) in a table. As you are examining any candidate tables, consider how they are presenting the results of the analysis. Do they report the fixed-effects estimates and the variance components? Are they reporting *p*-values? Which model summary measures are they including? Attach a copy of the table of model results from the article to your word-processed document. (Note: I only need the page(s) that include the table, not the whole article.)

11. Using the table you found, mimic the layout to present the results from the three models fitted for this assignment (LMER I, LMER II, and LMER III). **(2pts)**
12. Compute the estimate for AICc for each of the three fitted models. Report these in the summary table you just created.
13. Based on the estimated value of the AICc, which of the three models fitted thus far seems to fit the best? Explain.