

Homework #4

DUE Tuesday 13 November in class

Recall the anticipatory timing experiment. The scientific questions of interest for this homework are: Is there an association between the outcome and age? Between the outcome and gender?

The purpose of this homework is to carry out a complete analysis of these data to answer the stated scientific questions using a General Linear Mixed Model as we have learned in class. Use categorical age or continuous age, as you feel is appropriate. Use whatever interactions you feel are needed. Use our model building procedure:

- Decide upon a reasonable mean model to get residuals for EDA; you already did this in HW #1. Carry out exploratory data analysis for the mean and the covariance structures; you already did this in HW #1. Now also make the two new plots we learned about for GLMMs: make a plot of *each person's* trend across time, and make a plot of the OLS residuals squared across time.
- Decide which random-effects based covariance structures seem reasonable to consider based on your EDA plots. (You do NOT need to also consider GLM covariance structures.) Now select only one of them using formal statistical tests, if possible, or AIC/BIC otherwise.
- Using your chosen covariance structure, reduce your mean model by eliminating non-significant terms, if possible. However, keep in mind the scientific questions of interest. Do not throw out terms which are needed to answer the questions.
- Carry out diagnostics to check for violations of model assumptions.

Use your modeling to answer the following questions.

1. Describe what your two new EDA plots tell you.
2. Again write a Results section for a manuscript. Use your Homework # 3 and the sample solution for Homework # 3 as guides. Again, the Results section should briefly describe trends in the data by reporting relevant summary statistics, give the main results of the analyses, and detail the answers to the scientific questions of interest and their interpretations, and lastly VERY briefly summarize (one sentence) whether diagnostics found any indications of model violations.
3. Compare your final model from Homework #3 to your final model from Homework #4. Which model provides a better fit to the data? BRIEFLY justify your answer by e.g. comparing diagnostics or AIC/BIC. You do not need to provide a formal statistical test.

DO NOT attach computer output for every model you try fitting. DO attach computer output for your final model ONLY. This is a homework assignment and not a project; spend a few hours only on this. There is no one correct approach.