Practical: Round up of hierarchical models

Data

1. The `hsb data`.
   In this session, we are going to use the `High-School-and-Beyond data` which we considered in practical 1. Data are held in `hsb_selected.dta`. The variables are:

```
minority        Indicator of student ethnicity (1=minority, 0=other)
female          Indicator of student being female
ses             Standardized Socio-Economic Status score
mathach         Measure of mathematics achievement
size            School's total number of students
sector          School's sector: 1=Catholic, 0=not Catholic
schoolid        School identifier
```

Questions

This practical is more free-form and the questions are open-ended. Therefore, there will not be any solutions. Using the lecture for guidance, as well as the previous practicals do the following:

1. Explore the data using summary statistics and plots. What do these analyses tell you about the possible mean and variance structures?
2. Using the `mixed` command include all fixed effects in the model and then find the best fitting variance structure. What methods are you using for fitting? How do they relate to hypothesis tests?
3. Once you have the best variance structure, explore the mean effects, keeping the best variance structure you found.
4. Provide some diagnostic plots. How well do the models fit the data? Are there any outliers?