Case study

Sleep deprivation: Belenky et. al. [2003] report on a study of the effects of sleep deprivation on reaction time for a number of subjects chosen from a population of long-distance truck drivers. These subjects were divided into groups that were allowed only a limited amount of sleep each night. Each subject's reaction time was measured several times on each day of the trial.

In this data, the response variable Reaction, is the average of the reaction time measurements on a given subject for a given day. The two covariates are Days, the number of days of sleep deprivation, and Subject, the identifier of the subject on which the observation was made.

Scientific question: Is there a relationship between reaction time and the number of days of sleep deprivation?

Analysis:

- Explore the data carefully using graphical tools and descriptive statistics.
- Discuss very carefully the results of your data exploration and its implication for the model building.
- Carry out a model building exercise along the lines discussed in the lectures. Consider in your analysis
  - Models for the mean structure
  - Models for the random effects structure
  - Models for the residual error structure

Conclusion:

- What scientific insight does your final model offer?
- Interpret the final model using the estimated coefficients, graphical tools and confidence intervals.
- Answer the scientific question