1. Purposes of models

2. Explanatory and response variables

3. Models and residuals

   \[ y_i \quad \text{observation of case} \ i \ \text{on variable} \ y \quad (y \text{ is a quantitative variable}) \]
   \[ \hat{y}_i \quad \text{the model value for case} \ i \ \text{on variable} \ y \]
   \[ e_i \quad \text{the residual of case} \ i \]

   \[ y_i = \hat{y}_i + e_i \]

4. Simplest model

   \[ \hat{y}_i = \bar{y} \]

5. A categorical explanatory variable. Groupwise means as models.

   \[ \hat{y}_i = \text{mean of the observations in the group of the} \ i^{th} \ \text{case} \]

6. Partitioning variation

   \[ \text{variation in observations} = \text{model variation} + \text{residual variation} \]

Useful \textbf{R}

\begin{verbatim}
mean(stretch ~ treat, rubberbands)
rbmodel = mm(stretch ~ treat, rubberbands)
fitted(rbmodel)
residuals(rbmodel)
\end{verbatim}