The linear model

Adding more variables

- The main strategy for making useful probabilist models is to **allow the parameters to vary**
- If we have two measured variables:
  - y_i: the dependent variable, the outcome, the response, the predicted
  - x_i: the independent variable, the treatment, the control, the predictor

- We make the parameter μ a linear function of the predictor variable:

$$y_i \sim N(\mu_i, \sigma)$$
$$\mu_i = \alpha + \beta x_i$$

- This replaces μ with two new parameters:
  - α: the **intercept**
  - β: the **slope of x**

An ecological example

Tannins in plant–herbivore interactions

- tannin are the most abundant secondary metabolites in plants
- defense mechanism: defend leaves against herbivores by deterrence or toxicity
- tannins oxidize in insects, leading to oxidative stress