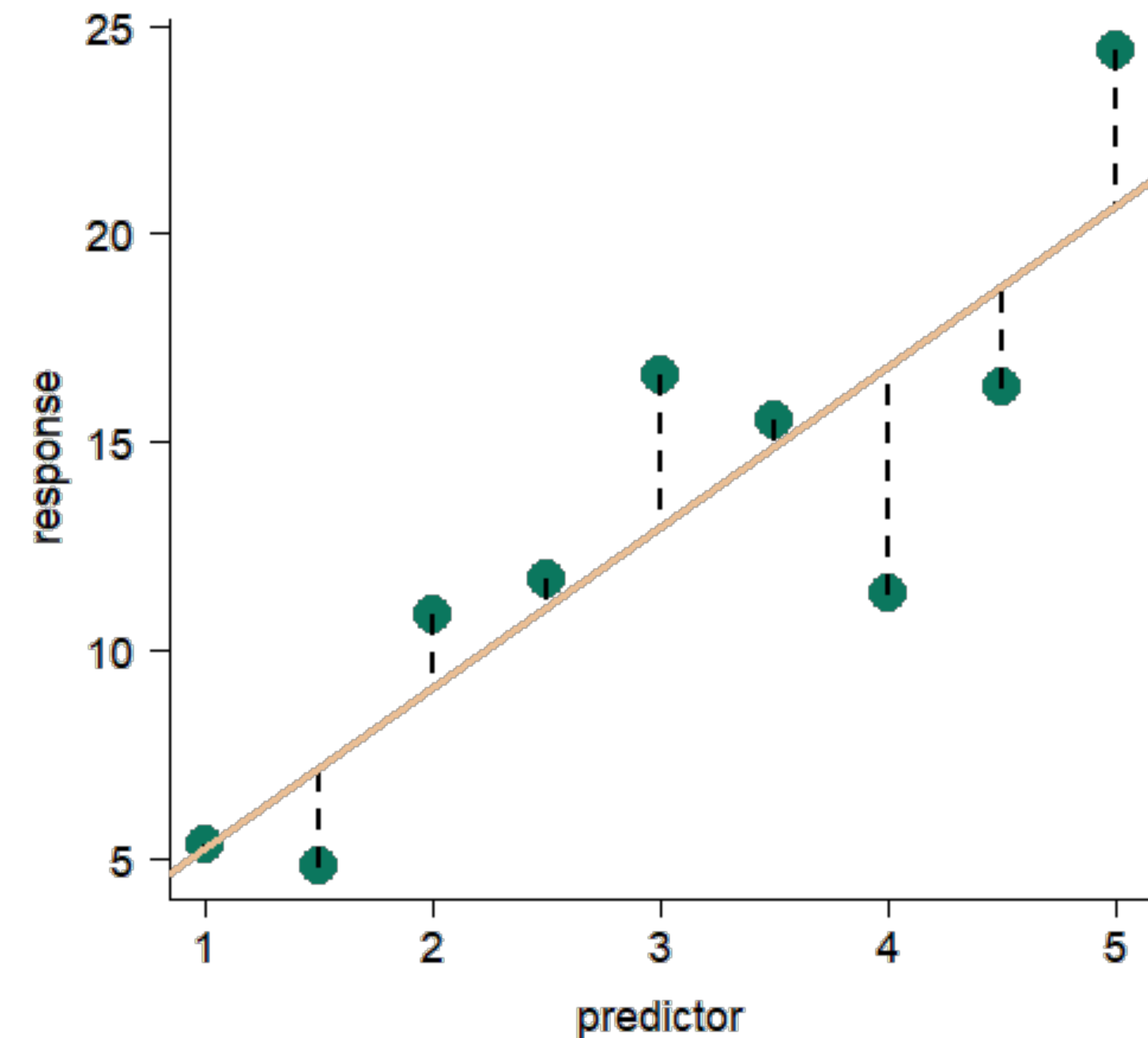


Other ways of fitting the linear model

OLS and Maximum Likelihood

- The standard linear model has many flavors and justifications
- Ordinary Least Squares (OLS) is the most common introduction, and consists of minimizing the squared distance between observations and the regression line
- Maximum likelihood (ML) looks for the parameters that maximize the probability of observing y_i :
 - $P(y_i | \theta = \{\alpha, \beta, \sigma\})$
 - ML finds the same solution as OLS under a gaussian model

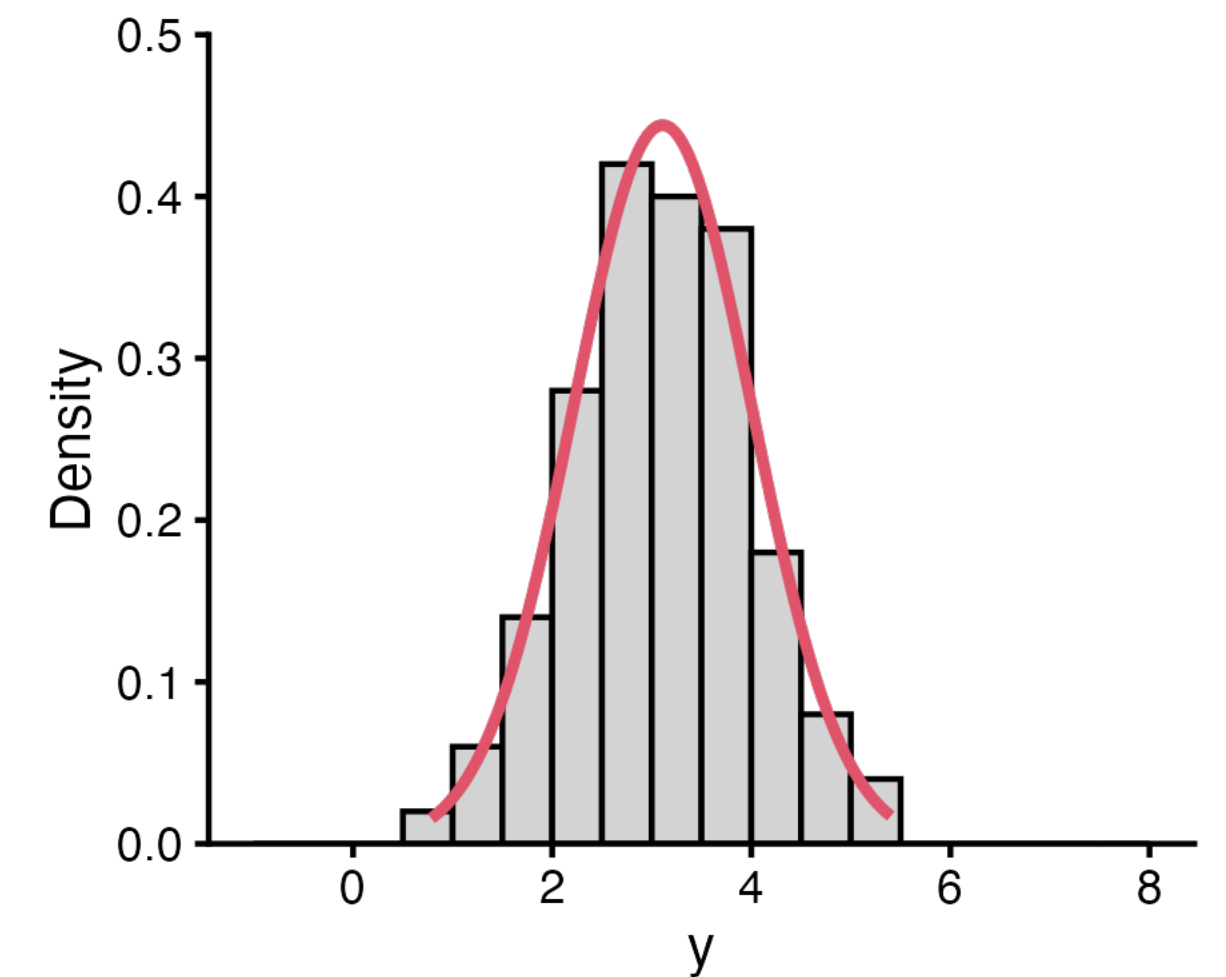


Other ways of fitting the linear model

lm() function for linear models

- The lm() function in R can fit most of the models we saw with OLS using a formula notation
- R formulas:
 - $y \sim 1$ (y as a function of a constant)
 - $y \sim x$ (y as a function of x, same as $1 + x$)
- OLS assumes fixed uniform priors, so we can't change them

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



```
> df <- data.frame(y = rnorm(100, 3, 1))

# OLS model:
> ols_fit = lm(y ~ 1, data = df)
> precis(ols_fit, prob = 0.95)
              mean  sd 2.5% 97.5%
(Intercept) 3.03 0.1 2.83 3.24
> (summary(ols_fit)$sigma)
[1] 1.037191
```