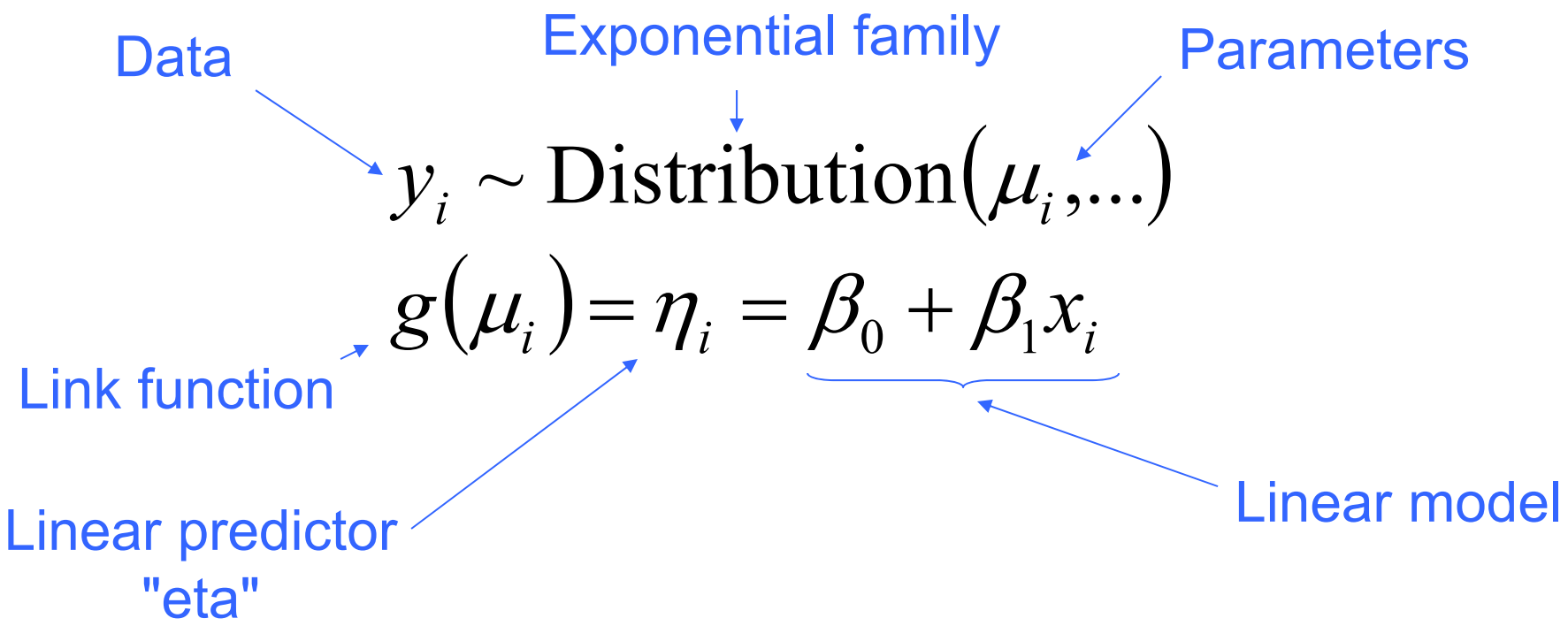
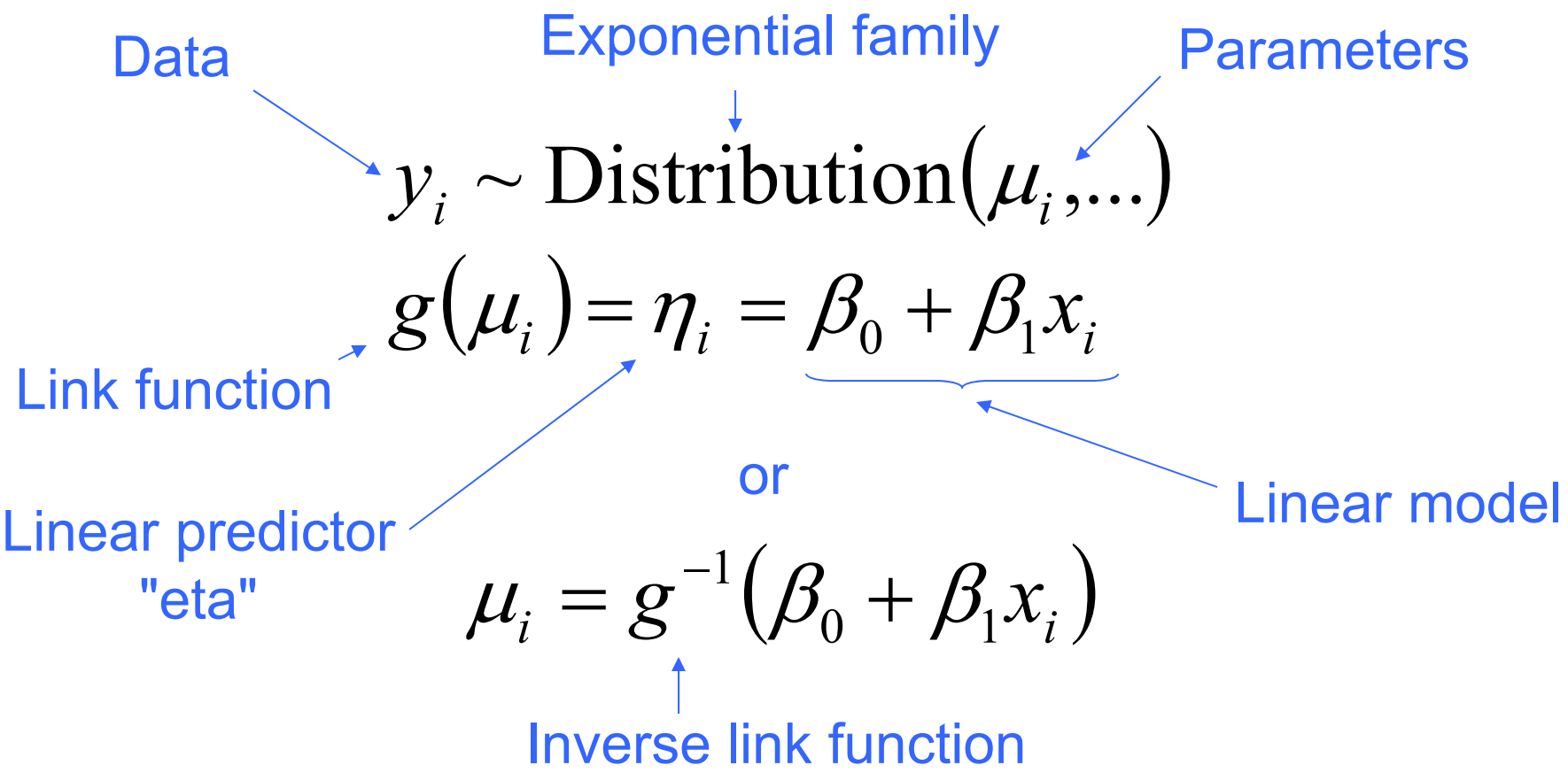
Main points McElreath Ch 9

- Generalized linear models



Main points McElreath Ch 9

- Generalized linear models



Main points McElreath Ch 9

- Exponential family (some)
  - Exponential, Gamma, Normal, Poisson, Binomial
- Link functions (some)
  - identity, log, logit

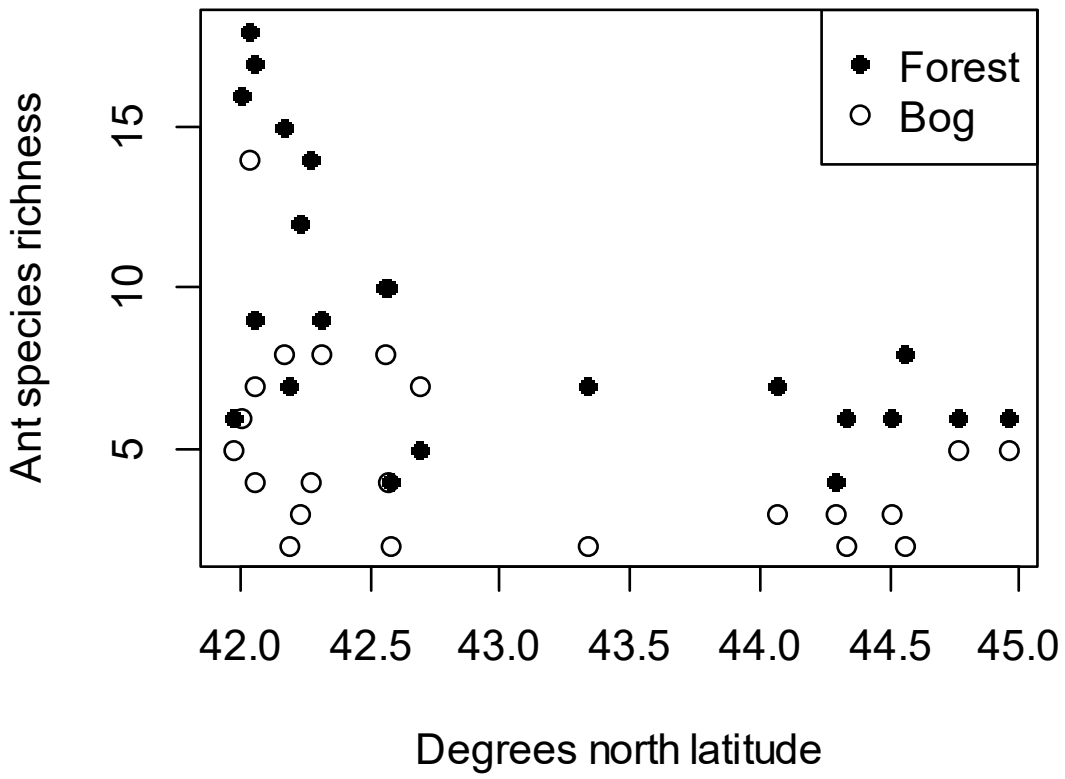
Most common models

Normal + Identity link	Poisson + Log link	Binomial + Logit link
$y_i \sim \text{Normal}(\mu_i, \sigma)$	$y_i \sim \text{Poisson}(\mu_i)$	$y_i \sim \text{Binomial}(\mu_i, n)$
$\mu_i = \beta_0 + \beta_1 x_i$	$\log(\mu_i) = \beta_0 + \beta_1 x_i$	$\log\left(\frac{\mu_i}{1-\mu_i}\right) = \beta_0 + \beta_1 x_i$

Inverse link functions:

$\mu_i = \eta_i$	$\mu_i = e^{\eta_i}$	$\mu_i = \frac{e^{\eta_i}}{1+e^{\eta_i}}$

Dataset to analyze



What will the data-generating model be?
Ignore pairs for now

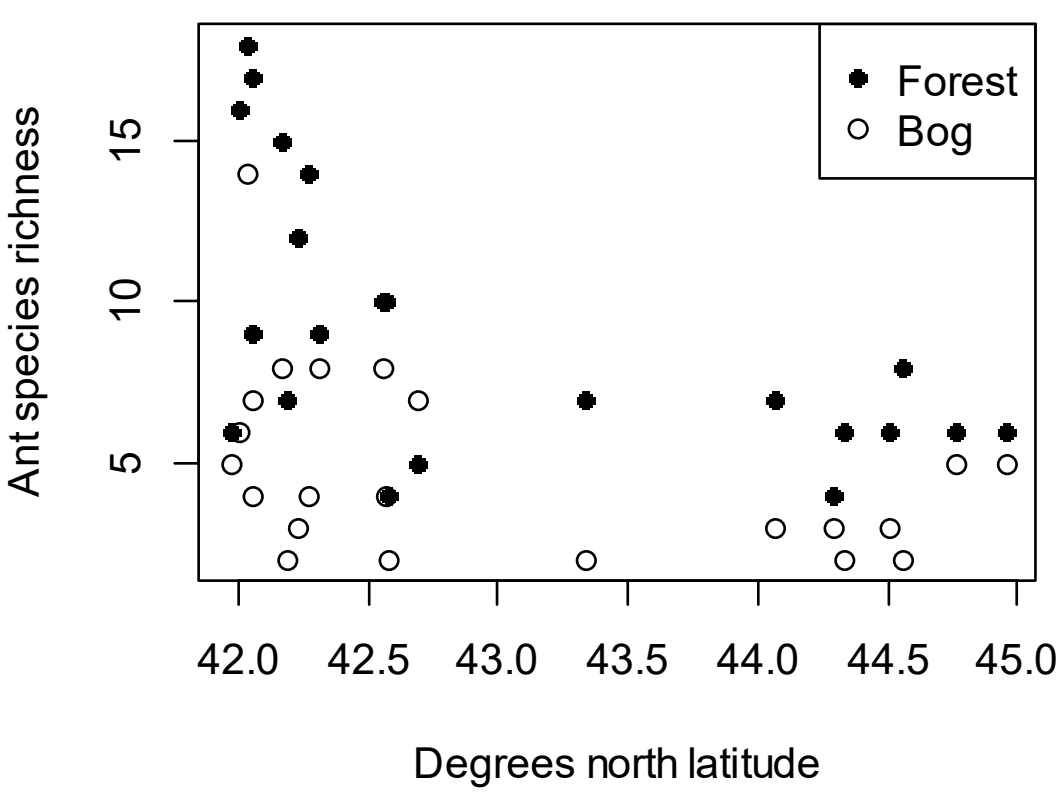
Scientific questions:

How different is species richness between habitats?

How does species richness vary with latitude?

Is this relationship different between habitats?

Dataset to analyze



Model:

Distribution

Link function

Inverse link function

Model matrix

$$\eta_i = \beta_0 + \beta_1 forest_i + \beta_2 latitude_i + \beta_3 forest_i \times latitude_i$$

Data

habitat	latitude	richness
forest	42	16
forest	42.56	10
forest	43.33	7
forest	44.76	6
bog	42.17	8
bog	42.57	4
bog	44.06	3
bog	44.95	5

Design matrix `model.matrix(fit)`

intercept	forest	latitude	forest:latitude
1	1	42	42
1	1	42.56	42.56
1	1	43.33	43.33
1	1	44.76	44.76
1	0	42.17	0
1	0	42.57	0
1	0	44.06	0
1	0	44.95	0

$$\eta_i = \beta_0 intercept_i + \beta_1 forest_i + \beta_2 latitude_i + \beta_3 forest_i \times latitude_i$$