

General Linear Model

$$Y = \underbrace{\beta_0 + \beta_1 X_1 + \beta_2 X_2 + \dots + \beta_R X_R}_{\substack{\text{deterministic model} \\ \text{for } E(Y|X) \\ \text{"mean" model}}} + \underbrace{\varepsilon}_{\substack{\text{stochastic model} \\ \text{"variance" model}}}; \varepsilon \stackrel{iid}{\sim} N(0, \sigma^2)$$

Generalised Linear Model (GLM)

$$g(\mu_i) = \underbrace{\beta_0 + \beta_1 X_1 + \dots + \beta_R X_R}_{\substack{\text{"mean" model for } \mu_i = E(Y)}} + \text{variance model}$$

New features:

- a link function or transformation $g(\cdot)$
- iterative weighting based on an appropriate variance model
- model often fitted to grouped or aggregated data

Special case: if $g(\mu) = \mu$, i.e. the identity link and we have constant fixed weights (assuming a normal error variance), fitted to individual level data the GLM is just the General Linear Model