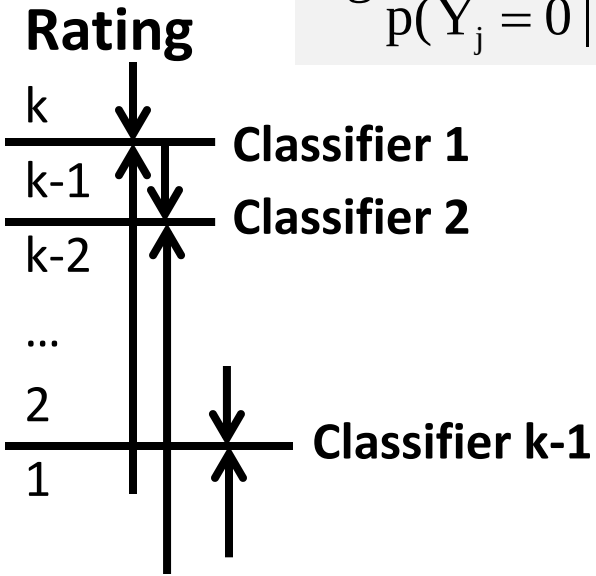
Ordinal Logistic Regression

Key Idea: $\forall i = 1, \ldots, M, \forall j = 3, \ldots, k, \beta_{ji} = \beta_{j-1i}$

➔ **Share training data** ➔ **Reduce # of parameters**

$$\log \frac{p(Y_j = 1 \mid X)}{p(Y_j = 0 \mid X)} = \log \frac{p(r \geq j \mid X)}{1 - p(r \geq j \mid X)} = \alpha_j + \sum_{i=1}^{M} x_i \beta_i \qquad \beta_i \in \Re$$



$$p(r \geq j \mid X) = \frac{e^{\alpha_j + \sum_{i=1}^{M} x_i \beta_i}}{e^{\alpha_j + \sum_{i=1}^{M} x_i \beta_i} + 1}$$

How many parameters are there in total? **M+k-1**