Nominal and ordinal responses

Ordinal: Groups with an ordering.
Nominal: Groups without an ordering.

Examples:

- Car air condition preferences: *little importance, important, very important*
- Laptop color preferences: *gray, green, pink, yellow*
- Course satisfaction: *poor, good, very good, excellent*
- Housing satisfaction: *low, medium, high*
- Breath: *normal, boarder line, abnormal*
- Political sympathies: *SV, Ap, Sp, V, KrF, H, Frp*
- Grades *A, B, C, D, E, F*

Nominal logistic regression

Response: $y \sim m(n, \pi_1, \pi_2, \ldots, \pi_J)$

Link function: $\eta_j = logit(\pi_j) = \log(\frac{\pi_j}{\pi_J})$
For $j = 1, \ldots J$. Chose a reference category (here $j = J$)

Linear component: $\eta_j = X\beta_j$

Illustration proportional odds model

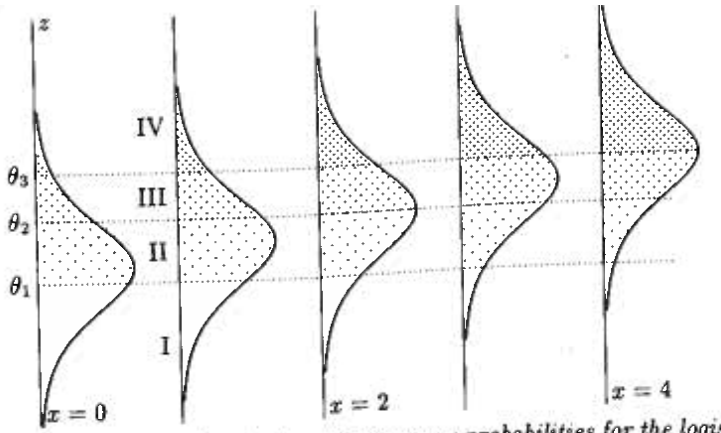

Fig. 5.1a. *Diagram showing how the response probabilities for the logistic model (5.1) vary with x when $\beta > 0$. Response categories are represented as four contiguous intervals of the z-axis. Higher-numbered categories have greater shade density.*

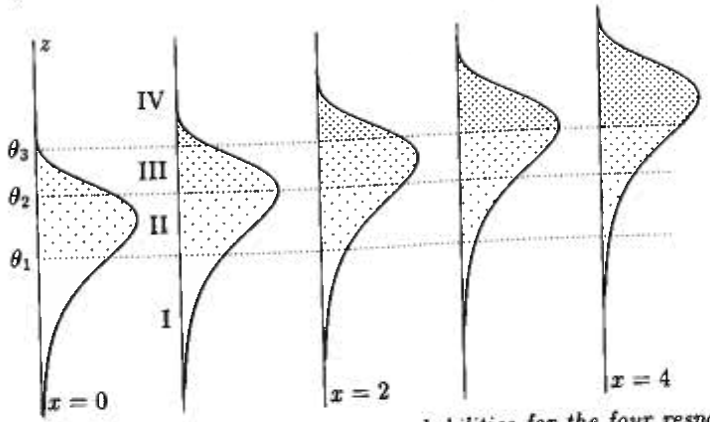

Fig. 5.1b. *Diagram showing how the probabilities for the four response*