# 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*
- Grads: *A, B, C, D, E, F*

# Laptop color preferences

Color preferences for people who buys a laptop.
Available colors: green, pink, yellow, gray
Explanatory variables: sex (M,F) and age ($< 19, 19 - 65, > 65$)
Model:

| | | Yellow | Green | Pink | Gray |
|---|---|---|---|---|---|
| Males | $< 19$ | 0.4 | 0.4 | 0.05 | 0.15 |
| | $19 - 65$ | 0.2 | 0.3 | 0.02 | 0.48 |
| | $> 65$ | 0.1 | 0.5 | 0.05 | 0.35 |
| Females | $< 19$ | 0.3 | 0.3 | 0.3 | 0.1 |
| | $19 - 65$ | 0.3 | 0.2 | 0.2 | 0.3 |
| | $> 65$ | 0.3 | 0.2 | 0.3 | 0.2 |

# Goodness of fit

Pearson chi-square residuals:

$$r_i = \frac{o_i - e_i}{\sqrt{e_i}}$$

Chi-square statistic: $X^2 = \sum_{i=1}^{N} r_i^2 \approx \chi^2(N-p)$

Deviance: $D = 2(l(b_{max}) - l(b)) \approx \chi^2(N-p)$

Likelihood ration chi-square statistic $C = 2(l(b) - l(b_{min}))$
$$\approx \chi^2(p - (J-1))$$

AIC: $AIC = -2l(\hat{\pi}; y) + 2p$