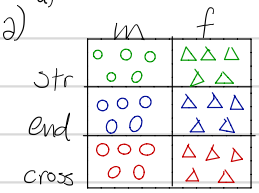
2) a)



This is a crossed design

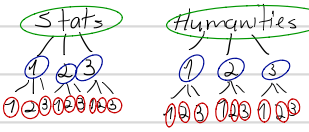
$y_{ijt} = \alpha_i + \beta_j + (\alpha\beta)_{ij} + \varepsilon_{ijt}$ $\quad \varepsilon \sim N(0, \sigma^2)$

$i = m, f$

$j = str, end, cross$

$t = 1, \dots, 6$

b)



This is a nested design (but actually a random-effects)

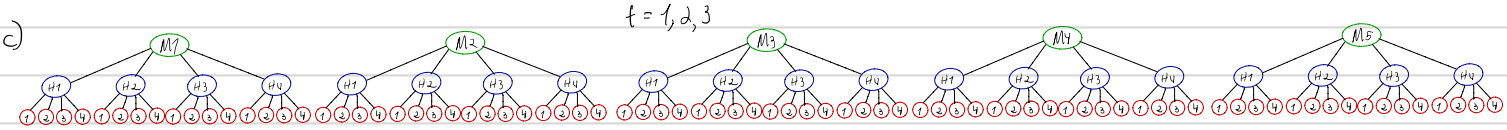
$y_{ijt} = \alpha_i + \beta_{j(i)} + \varepsilon_{ijt}$ $\quad \varepsilon \sim N(0, \sigma^2)$

$i =$ stats, humanities

$j = 1, 2, 3$

$t = 1, 2, 3$

c)



This is a nested design where head is nested in machine

$y_{ijt} = \mu + \alpha_i + \beta_{j(i)} + \varepsilon_{ijt}$

$i = M_1, \dots, M_5$

$j = H_1, \dots, H_4$

$t = 1, \dots, 4$

$\varepsilon_{ijt} \sim N(0, \sigma^2)$