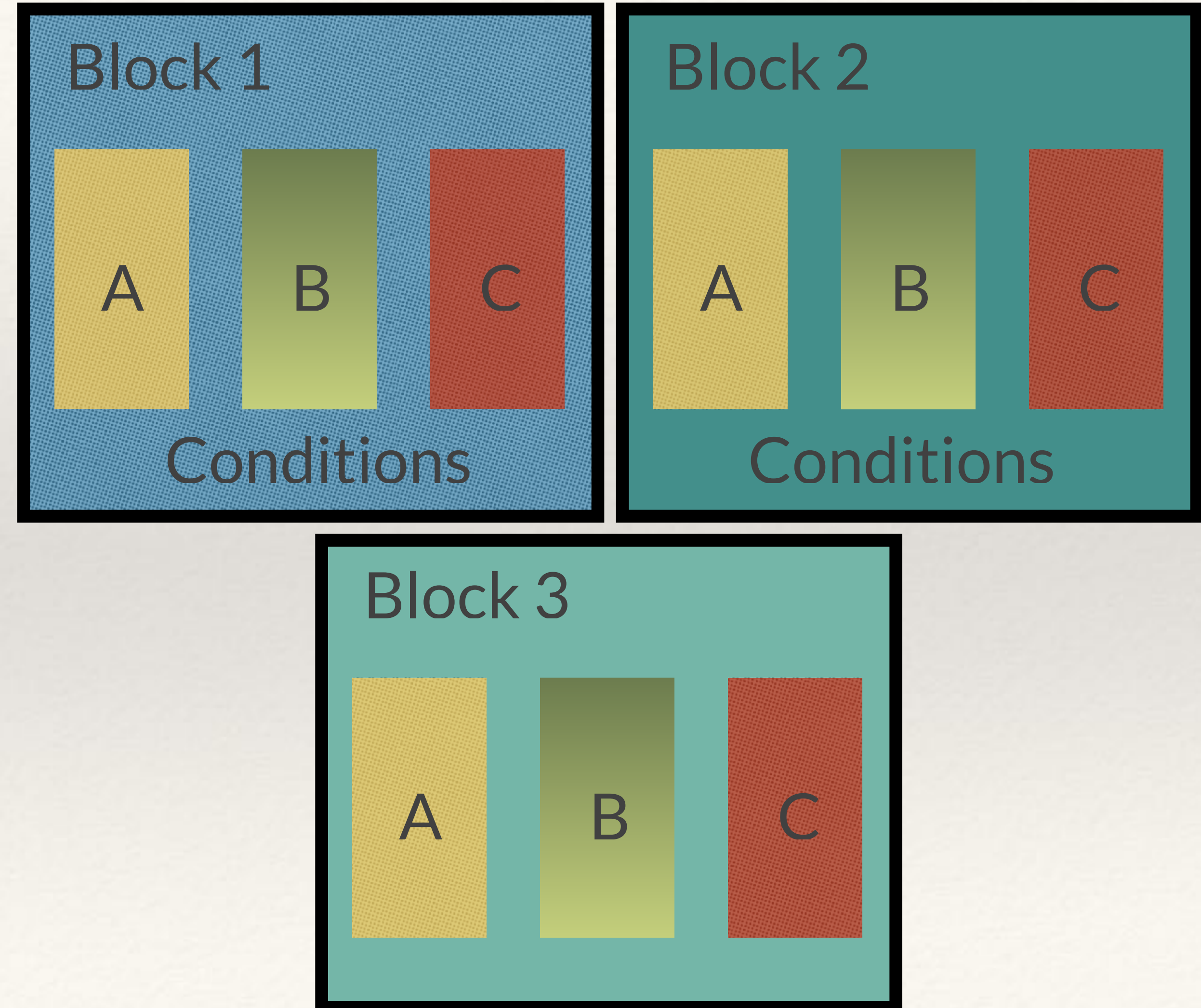


# BLOCKED EXPERIMENTAL DESIGNS

- Often in experiments there are natural blocks that exist non-intentionally.
- Even though these blocks were not created intentionally, they often still group experimental units that are more similar within blocks than between blocks due to unknown conditions.
- Analyzing results within each natural block makes it possible to separate treatment variability from variability due to the blocking factor that occurs unintentionally but systematically.





# ADDING BLOCKS USING MIXED MODELS

$$y_i \sim \text{Normal}(\mu_i, \sigma)$$

$$\mu_i = \alpha_0 + \alpha_{\text{block}[i]} + \beta x_i$$

$$\alpha_k \sim \text{Normal}(0, \sigma_\alpha), \text{ for } k \text{ in } \{1, \dots, N_{\text{blocks}}\}$$

$$\alpha_0 \sim \text{Normal}(0, 1)$$

$$\beta \sim \text{Normal}(0, 0.3)$$

$$\sigma, \sigma_{\text{block}} \sim \text{Exponential}(1)$$

