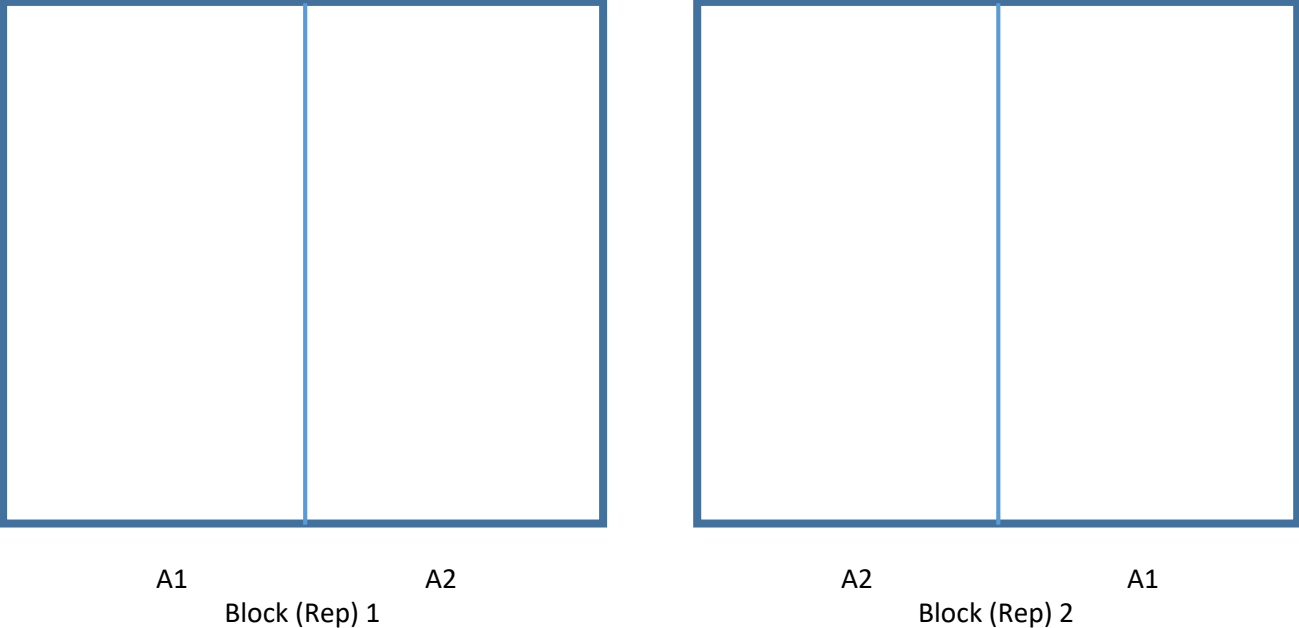
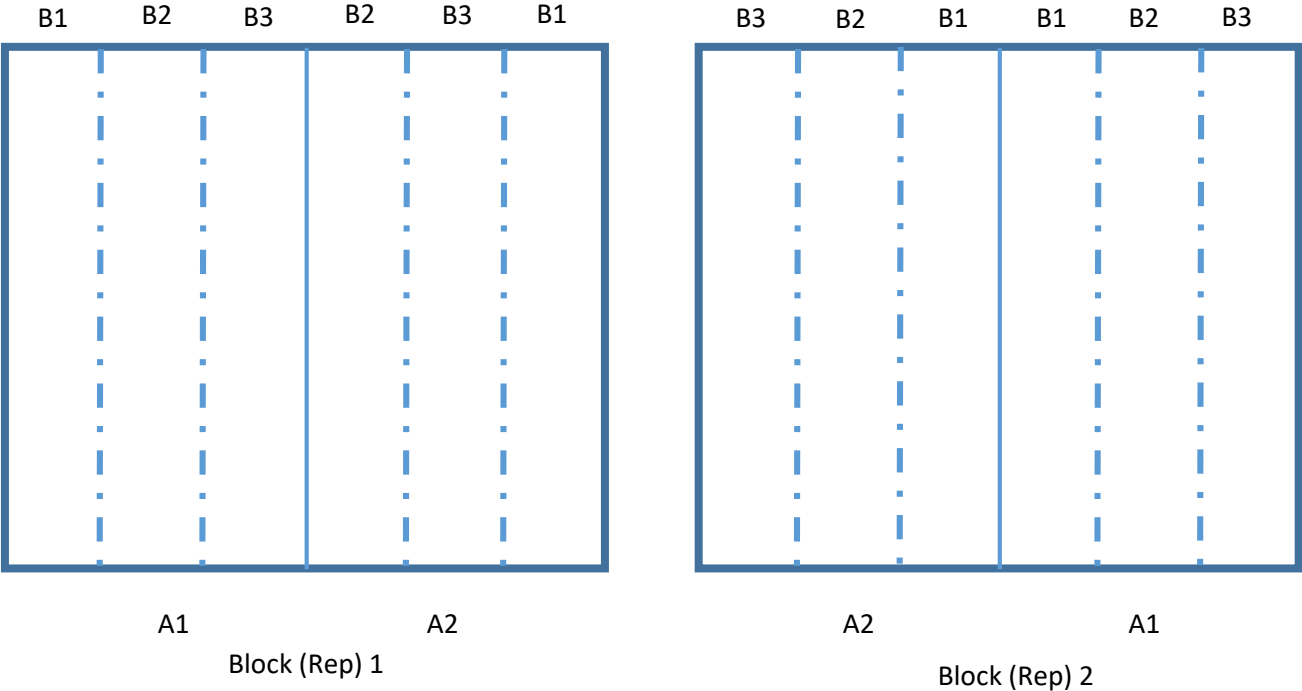


Split-split Plot Design

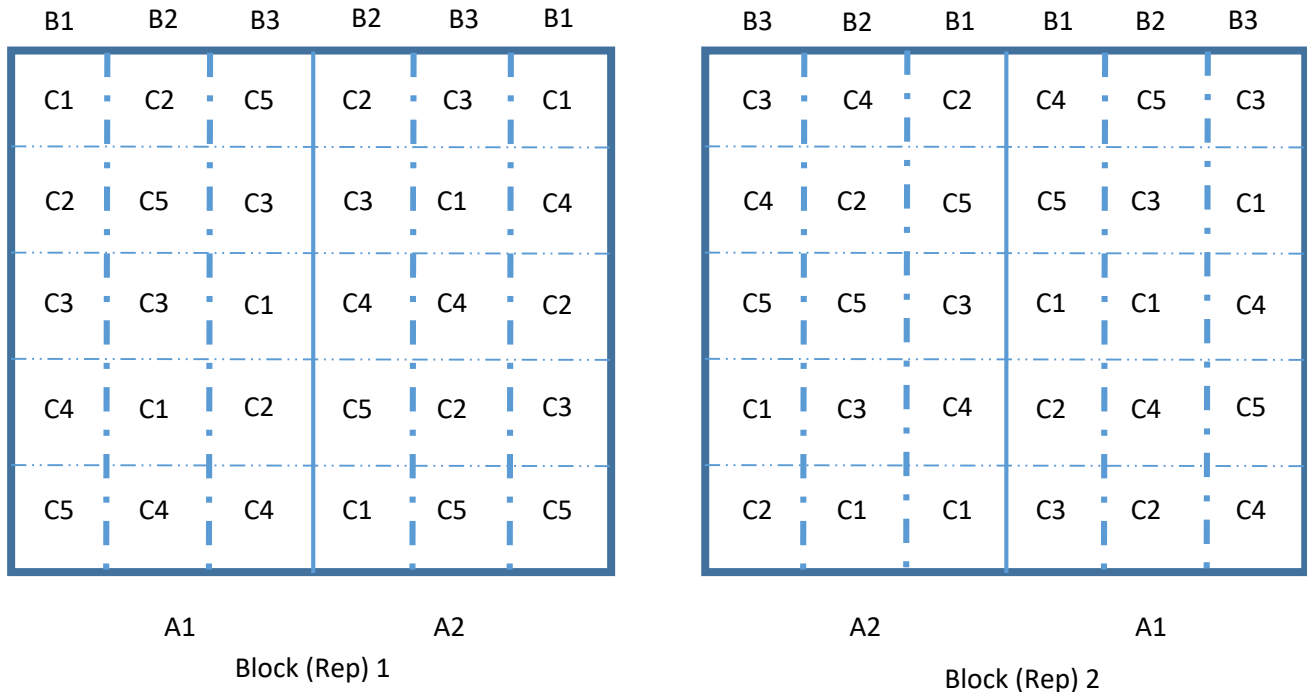
Factor A is the WHOLE Plot – with two levels: A1 and A2. A1 and A2 are randomly assigned within a block (or rep). In this illustration we have 2 Blocks (Reps).



The WHOLE plot is now divided into SUB Plots. Factor B, which has 3 levels is randomly assigned to each level of Factor A in the WHOLE plots.



The SUB plot is now divided into SUB-SUB Plots. Factor C, which has 5 levels is randomly assigned to each level of Factor B in the SUB plots.



If we were in the situation where we needed to add a 4th Factor D, then we could add it in a way to create a Split-Split-Split plot, where the SUB-SUB plot would be divided into SUB-SUB-SUB plots. Each SUB-SUB-SUB plot would be assigned a random combination of the levels of Factor D.

Let's build the model for the Split-Split plot design as modeled above:

$$Y_{ijkl} = \mu + Block_i + A_j + BlockA_{ij} + B_k + AB_{jk} + BlockB_{ik} + C_l + AC_{jl} + BC_{kl} + ABC_{jkl} + e_{ijkl}$$

Where:

- Y_{ijkl} = Measurement of your outcome variable
- μ = Overall mean
- $Block_i$ = Random effect of your Block or Rep
- A_j = Fixed effect of your Factor A – Main plot
- $BlockA_{ij}$ = Random interaction between the Block or Rep and Factor A (Main plot factor)– this is the error term for Factor A – Main plot error
- B_k = Fixed effect of your Factor B – Sub plot
- AB_{jk} = Fixed interaction between Factor A and Factor B
- $BlockB_{ik}$ = Random interaction between the Block or Rep and Factor B (Sub plot factor) – this is the error term for Factor B and the interaction between Factor A and B – Sub plot error
- C_l = Fixed effect of your Factor C – Sub Sub plot
- AC_{jl} = Fixed interaction between Factor A and Factor C
- BC_{kl} = Fixed interaction between Factor B and Factor C
- ABC_{jkl} = Fixed interaction between Factor A, Factor B, and Factor C
- e_{ijkl} = Residual error – correct error term for Sub Sub plot Factor C, AC, BC, and ABC