Printout

Sunday, October 10, 2021 11:08 AM

Section 1

MANE 6313

Subsection 1

Week 8, Module A

Student Learning Outcome

- Select an appropriate experimental design with one or more factors,
- Select an appropriate model with one or more factors,
- Evaluate statistical analyses of experimental designs,
- Assess the model adequacy of any experimental design, and
- Interpret model results.

Module Learning Outcome

Explain blocking on replicates in two-level factorial designs.

Blocking a Replicated 2^k Factorial Design

- A 2^k factorial design with n replicates is identical to a blocked design where the block size is greater than 2^k
- See Example 7.1 on page 309
- Make sure to randomly assign treatments within a block (or replicate)
- Each block contains all 2^k treatment combinations
- Simplest experiments to design and analyze

A Simple Example of Confounding

- Consider a 2^2 experiment with factors A and B
- The experiment is run in two blocks. Block 1 contains the treatments *a* and *ab*; block 2 contains the treatments (1) and *b*
- Write an estimator (contrast) for the block effects
- Construct the contrasts for the effects *A*, *B* and *AB*

Block 1: a, ab

Block 2: (1), b

Contrast$_{blocks}$ = (a + ab) − ((1) + b)

a	b	trts	A	B	AxB
−	−	(1)	−	−	+
+	−	a	+	−	−
−	+	b	−	+	−
+	+	ab	+	+	+

Contrast$_A$ = (a + ab) − ((1) + b)

Contrast$_B$ = (b + ab) − ((1) + a)

Contrast$_{AB}$ = (ab + (1)) − (a + b)

Block treatment and main effect A are confounded

A Simple Example of Confounding, continued

Block Size $< 2^k$

- Often the block size is 2^p for k factors where $k > p$. This design is called incomplete because all the treatment combinations can not be performed in each block
- Requires an intelligent method to assign treatments to blocks
- These designs are run in two blocks, four blocks, eight blocks, etc. 2^p
- Confounding usually occurs in these designs. Confounding occurs when information about certain treatment effects can not be distinguished from the block effect.