1 General Factorial Models

Although many of our examples concern the simplest two-way factorial structures, higher-order factorial models are commonly used. Consider the ANOVA table for a three-factor model:

Source	df	SS	MS	F
A	a-1	SSA	MSA	F_A
B	b-1	SSB	MSB	F_B
C	c-1	SSC	MSC	F_C
AB	(a-1)(b-1)	SSAB	MSAB	F_{AB}
AC	(a-1)(c-1)	SSAC	MSAC	F_{AC}
BC	(b-1)(c-1)	SSBC	MSBC	F_{BC}
ABC	(a-1)(b-1)(c-1)	SSABC	MSABC	F_{ABC}
Error	(n-1)abc	SSE	MSE	
Total	nabc-1	SSTotal		

What will happen if only one replicate per treatment combination exists? Other important issues are the practice of pooling non-significant terms into the error term, and the common decision to restrict the choice of models to hierarchical models.

2 Interaction

The first step in dealing with interaction is to try to visualize it using a profile plot. See the example SAS code to observe a profile plot. Two common approaches for analyzing interactions are to look at simple main effect tests, or to use orthogonal treatment-interaction contrasts. The first way, simple main effects tests, is where we have compared a single factor (or set of factors) by holding constant other factors. For example, if there is an AB interaction, we may choose to compare the levels of the A factor when the B factor is restricted to level 1. These simple main effect tests can help describe the interaction, but we must remember that they involve both main effect and interaction sums of squares. The second way, orthogonal treatment-interaction contrasts, are slightly more complicated to construct, but they offer a way to partition just the interaction sums of squares.