INTRODUCTION TO BLOCKING

Nuisance factor: A factor that probably has an effect on the response, but is not a factor that we are interested in.

Types of nuisance factors and how to deal with them in designing an experiment:

Characteristics	**Examples**	**How to treat**
Unknown, uncontrollable	Experimenter bias, effect of order of treatments	Randomization
Known, uncontrollable, measurable	IQ, weight, previous learning	Analysis of Covariance
Known, moderately controllable	Temperature, location, time, batch, particular machine or operator, age, gender	Blocking

Randomization can in principal be used to take into account factors that can be treated by blocking, but blocking usually results in smaller error variance, hence better estimates of effect. Thus blocking is sometimes referred to as a method of *variance reduction design.*

The intuitive idea: Run in parallel a bunch of experiments on groups of units that are fairly similar.

The simplest block design: The *randomized complete block design* (RCBD)

v treatments (They could be treatment combinations.)

b blocks of v units, chosen so that units within a block are alike (or at least similar) and units in different blocks are substantially different. (Thus the total number of experimental units is n = bv.)

The v experimental units within each block are randomly assigned to the v treatments. (So each treatment is assigned one unit per block.)

Note that experimental units are assigned randomly only within each block, not overall. Thus this is sometimes called a *restricted randomization*.

Example: Five varieties of wheat are to be compared to see which gives the highest yield. Eight plots of farmland are available for the experiment. The experimenter divides each plot into five subplots. For each of the 8 plots, the varieties of wheat were randomly assigned to the subplots of that plot.

Treatment factor =
Response =
Blocking factor =
Blocks =
Experimental units =