Repeated measures/ paired data

Terms

When multivariate data consist of several determinations of basically the same characteristic (e.g., made with different instruments or at different times), the data are called **repeated measures data**.

Types of Studies

In the special case of bivariate responses, the term **paired** data is used.

Example:[Paired distortion]

Data Types

For the gears heat treating example, the measurements were actually made on the 77 gears both *before* and after *heat* treating.

Data Structure

Data structures

Terms

It is common for several sets of conditions to be compared with each other, in which **several samples** are involved. Here are two structures for multisample studies.

Types of Studies

Response variable

A **response variable** (or dependent variable) is the outcome of a study.

Data Types

Factor

Data structure A **factor** is any numerical or categorical variable with a finite set of possible values. A **level** is the value of the factor.

e.g. Heat

(complete) factorial study

A **(complete) factorial study** is one in which several process variables (and settings of each) are identified as being of interest and data are collected under each possible combination of settings of the process variables. The process variables are usually factors.

Terms

Types of Studies

Data Types

Data structure Example: [Pelletizing machine, pg. 6, 12]

Experimentation with a pelletizing machine using a $2 \times 2 \times 2$ or 2^3 factorial structure. The researchers are measuring the percentage of acceptable fuel pellets for various situations. The factors and respective levels are:

- **Die volume** low volume vs. high volume
- Material flow current method vs. manual filling
- Mixture type no binding agent vs. with binder

There are then 8 sets of conditions under which data are collected.

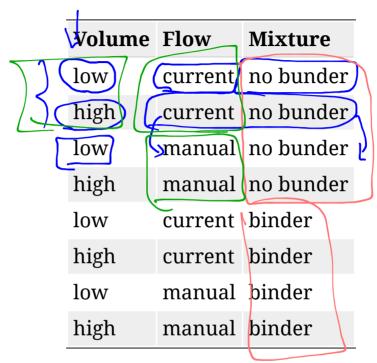
Terms

Types of Studies

Data Types

Data structure

Example: [Pelletizing machine, pg. 6, 12]



When there are many factors or levels are involved, the number of sampling units in a complete fractional study can guickly reach an impractical size.

Terms

Types of Studies

Data Types

Data structure

Fractional factorial study

A **fractional factorial study** is one in which data are collected for only some of the combinations that would make up a complete factorial study.

Example:[Pelletizing machine, cont'd]

,		Volume	Flow	Mixture
			,	no bunder
\	3	low	manual	no bunder
	5	low	current	binder
	8	high	manual	binder