

## Example - Dependent Samples

Tardive dyskinesia denotes a syndrome comprising a variety of abnormal involuntary movements assumed to follow long-term use of antipsychotic drugs. In an experiment to see whether the drug deanol produced an effect over baseline scores of a placebo treatment, the two treatments were administered for four weeks each in random order to 10 patients. Results from these treatments, as measured by total severity index (TSI) scores are:

Patient	1	2	3	4	5	6	7	8	9	10
Deanol	12.4	12.6	13.2	12.1	5.9	12.0	11.5	13.0	5.1	9.6
Placebo	9.2	12.2	12.7	12.4	5.9	8.5	7.8	9.1	3.5	6.4

SAS Code using Proc ttest:

```
options pageno = 1;
title "Comparison of Two Types of Treatments for Tardive Dyskinesia";
data drug;
input placebo deanol;
datalines;
12.4 9.2
12.6 12.2
13.2 12.7
12.1 12.4
5.9 5.9
12.0 8.5
11.5 7.8
13.0 9.1
5.1 3.5
9.6 6.4
;
title2 "Analysis Using an Paired T-test";
proc ttest data = drug;
paired placebo*deanol;
run;
```

The components, with explanation, of Proc ttest for the comparison of two means from paired samples are:

```
proc ttest data = drug;           (Invokes Proc ttest and tells SAS to use the "drug" data set.)

    paired placebo*deanol;       (Describes the paired responses for comparison .)

run;
```

## Randomization of Treatments to Experimental Units for a CRD using SAS

For a completely randomized design the randomization of the treatments to a set experimental units is a fairly simple process. First you must construct a variable which has entries corresponding to the treatment values (e.g., 1, 2, etc.), with exactly the same number of treatment values as there are observations for a given sample. Next a set of uniform random numbers is created using the SAS uniform random number function (RANUNI). These two sets are sorted based on the uniform random numbers and printed. The assignment of experimental units, labeled 1 to n, follows directly from the printed treatments.

### Example

Suppose that an experiment which was to follow the protocol for a completely randomized design was to involve 4 treatments, each with 5 observations (replicates). The SAS code performing the random assignment of treatments to experimental units is

```
data random;
input treatments @@;
rv = ranuni(1);
cards;
1 1 1 1 1
2 2 2 2 2
3 3 3 3 3
4 4 4 4 4
;
proc sort data = random; by rv;
run;
proc print data = random;
run;
```

```
rv = ranuni(1);
```

```
proc sort data = random; by rv;
```

In the above code you are using a function “ranuni(1)” which creates a uniform (0, 1) random variable for each observation (total of 16). The 1 in parentheses is the “seed” to start the random number generation and is required. The seed can be any real number, but you must choose one.

The Sort procedure sorts the declared data set (random) using the values in the variable “rv”. By default they are sorted in descending order. Options for the sort routine allow for other methods of sorting. You should look at the SAS Online documentation to learn more.