

1 One-way repeated measures ANOVA

1.1 Overview

A one-way repeated measures ANOVA is used when you have a single predictor with three or more levels and the the levels are dependent on each other, usually through repeated measures or a matched design.

Here is an example of where the test is used: a pharmaceutical company is interested if a new drug affects the weight of subjects. Subjects' weights are measured after one month, three months and five months.

The assumptions are:

- Response variable should be quantitative.
- Predictor variable should consist of a least two dependent groups.
- There should be no significant outliers in the differences between two dependent groups.
- The distributions of the differences in the dependent variable between any two of the related groups should be approximately normally distributed.
- The variances of the differences between all combinations of related groups must be equal, this is known as sphericity. A rule of thumb for this is that the largest standard deviation should not be larger than two times the smallest standard deviation. It becomes more of a problem if you have very unequal sample sizes or non normal data. If you have non-normal data and unequal variances you may consider a transformation.

If your data is non-normal then you should consider a Friedman test.

If the samples are independent you should perform a one-way ANOVA.

1.2 Analysis plan

For descriptive statistics, you should calculate the sample size, sample mean, sample variance and standard deviation for each level of the categorical variable. You can also draw box plots for each level and box plots for the differences between relevant levels. The same can be done for histograms and stem and leaf plots.

Here are some examples of a one-way repeated measures ANOVA being carried out:

<http://www.youtube.com/watch?v=VPB3xrsF14o> (by hand)

<http://www.youtube.com/watch?v=Ep0kGn0i4n0> (in SPSS)

<http://www.ats.ucla.edu/stat/r/whatstat/whatstat.htm#1repanovA> (in R)

If you have significant results a good follow up test is a paired sample t-test, an example can be found here:

<http://www.youtube.com/watch?v=WB3baLtBhTU> (in SPSS)