TWO WAY ANOVA

Two Way Analysis of Variance

TWO WAY ANOVA

- One-way ANOVA is used to test the claim that three or more population means for the *K* levels of a single independent variable are equal
- The two-way ANOVA is an extension of one-way ANOVA, compares the mean differences between populations that have been split on **two independent variables (called factors)**

CONDITIONS OR ASSUMPTIONS

- The data are randomly sampled
- The dependent variable should be approximately normally distributed
- The population variances in each combination of the groups of the two independent variables are equal (homogeneity of variances)

HYPOTHESIS

- Is there any effect of Factor A on the outcome? ***(Main Effect of A).***
- Is there any effect of Factor B on the outcome? ***(Main Effect of B).***
- Is there any effect of the interaction of Factor A and Factor B on the outcome? **(Interactive Effect of AB)**

VARIATION

- Within-cell variation
- Variation among the *J* row means
- Variation among the *K* column means
- Variation due to interaction between the two independent variables

EXAMPLE

100 participants suffering from depression were divided into 4 groups of 25 each. Each group was given a different medicine. After 4 weeks, participants filled out the BDI, short for Beck's depression inventory.

Our main research question is: did our different medicines result in different mean BDI scores?

A secondary question is whether the BDI scores are related to gender in any way. In short we'll try to gain insight into 4 (medicines) x 2 (gender) = 8 mean BDI scores.

TWO-FACTOR DESIGN

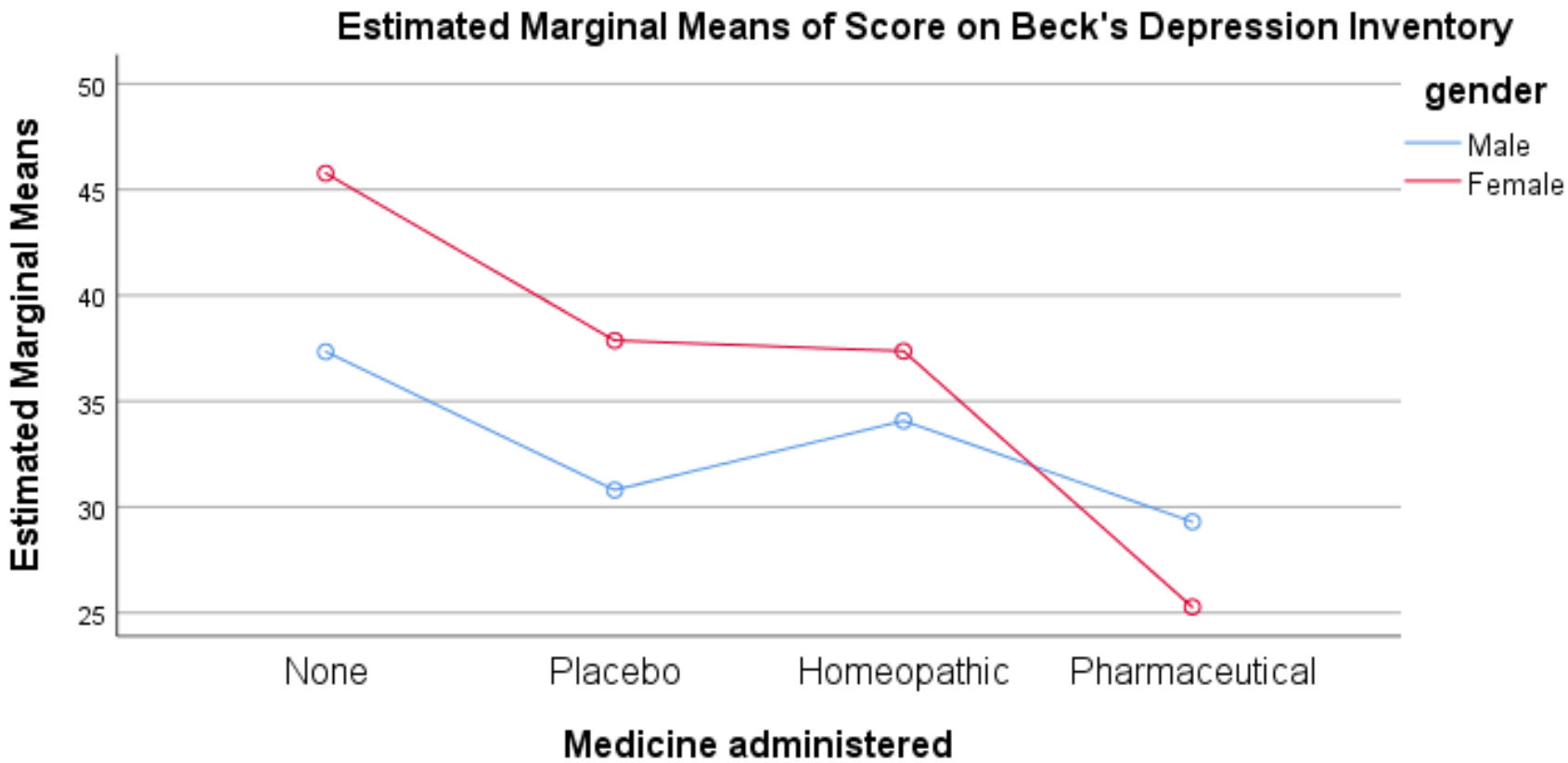
		Medicine			
		None	Placebo	Homeopathic	Pharmaceutical
Gender	Female				
	Male				

HYPOTHESIS - EXAMPLE

- **#1**
  H_0: The medicine type has no impact on BDI scores

- **#2**
  H_0: The gender of subject has no impact on BDI scores

- **#3**
  H_0: There is no interaction between medicine type and gender of subject

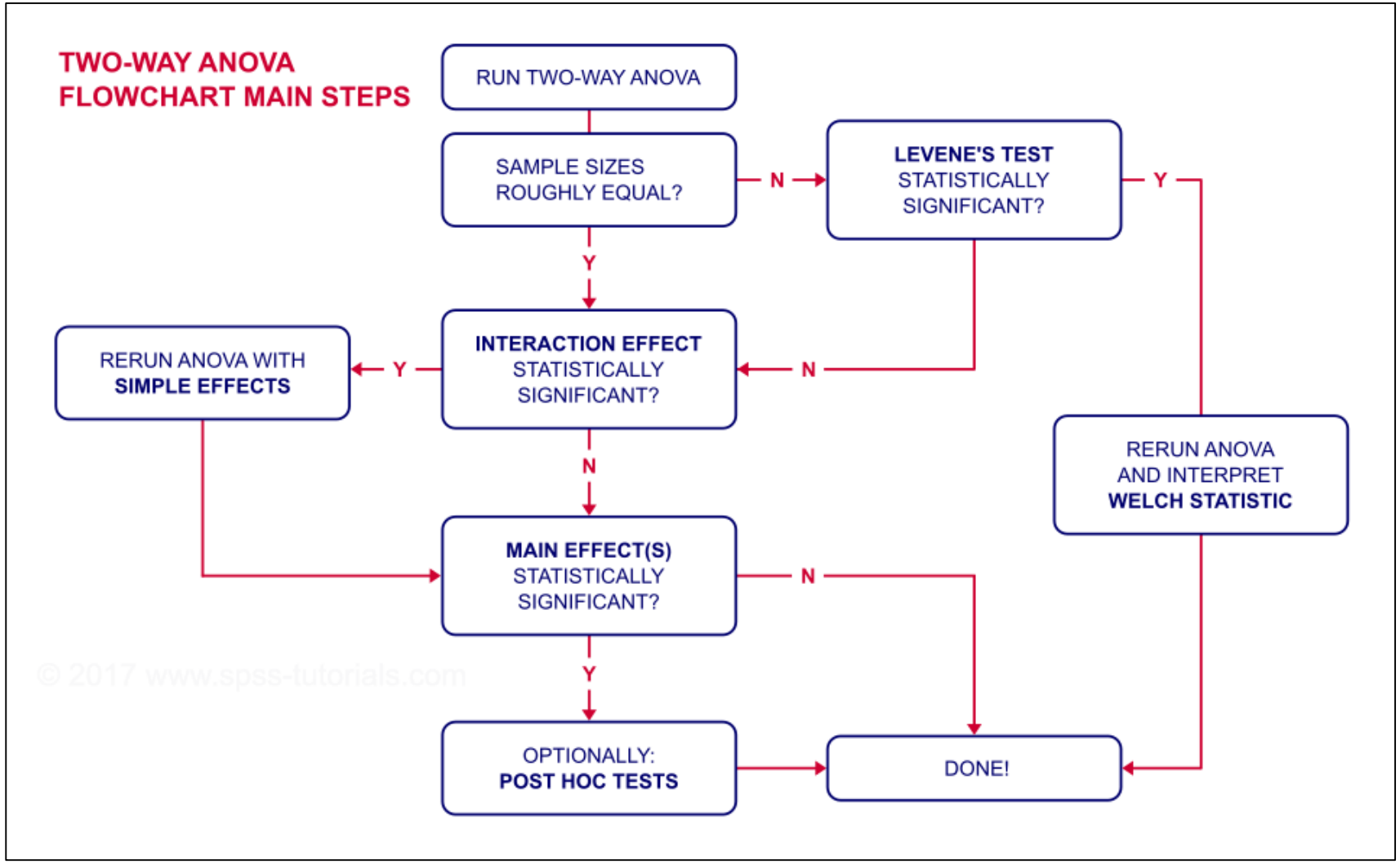

Estimated Marginal Means of Score on Beck's Depression Inventory
Estimated Marginal Means
50
45
40
35
30
25
None
Placebo
Homeopathic
Pharmaceutical
Medicine administered
gender
Male
Female

FURTHER TEST

Multiple-Comparison Procedures for the Main Effects

Test of Simple Effects

TWO-WAY ANOVA



Source : https://www.spss-tutorials.com/spss-two-way-anova-interaction-significant/