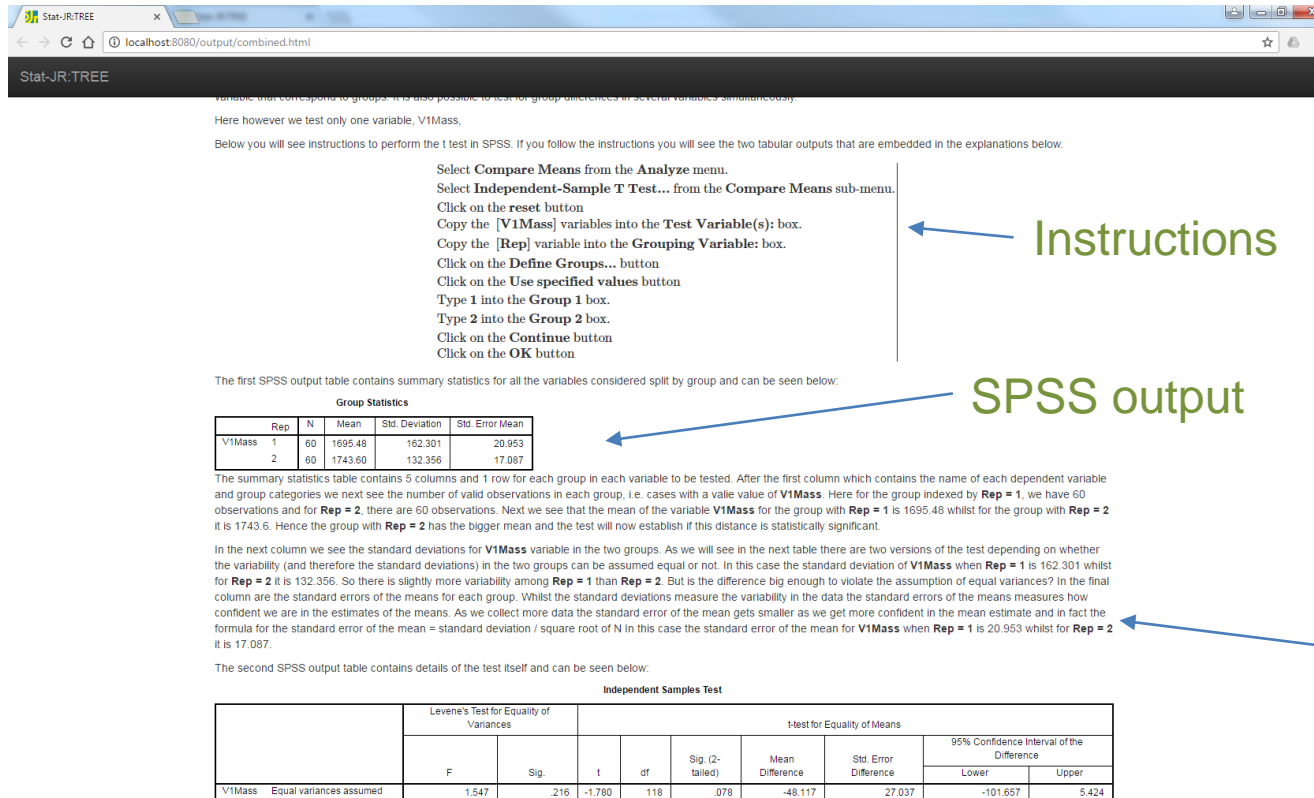


Example Data Intensive Research project with interdisciplinary uses – *Using Statistical E-books to teach undergraduate students quantitative methods and statistical software*



variable that correspond to groups. It is also possible to test for group differences in several variables simultaneously.

Here however we test only one variable, V1Mass.

Below you will see instructions to perform the t test in SPSS. If you follow the instructions you will see the two tabular outputs that are embedded in the explanations below.

Select **Compare Means** from the **Analyze** menu.  
 Select **Independent-Sample T Test...** from the **Compare Means** sub-menu.  
 Click on the **reset** button  
 Copy the [V1Mass] variables into the **Test Variable(s)** box.  
 Copy the [Rep] variable into the **Grouping Variable:** box.  
 Click on the **Define Groups...** button  
 Click on the **Use specified values** button  
 Type **1** into the **Group 1** box.  
 Type **2** into the **Group 2** box.  
 Click on the **Continue** button  
 Click on the **OK** button

The first SPSS output table contains summary statistics for all the variables considered split by group and can be seen below:

Group Statistics					
	Rep	N	Mean	Std. Deviation	Std. Error Mean
V1Mass	1	60	1695.48	162.301	20.953
	2	60	1743.60	132.356	17.087

The summary statistics table contains 5 columns and 1 row for each group in each variable to be tested. After the first column which contains the name of each dependent variable and group categories we next see the number of valid observations in each group, i.e. cases with a valid value of V1Mass. Here for the group indexed by Rep = 1, we have 60 observations and for Rep = 2, there are 60 observations. Next we see that the mean of the variable V1Mass for the group with Rep = 1 is 1695.48 whilst for the group with Rep = 2 it is 1743.6. Hence the group with Rep = 2 has the bigger mean and the test will now establish if this distance is statistically significant.

In the next column we see the standard deviations for V1Mass variable in the two groups. As we will see in the next table there are two versions of the test depending on whether the variability (and therefore the standard deviations) in the two groups can be assumed equal or not. In this case the standard deviation of V1Mass when Rep = 1 is 162.301 whilst for Rep = 2 it is 132.356. So there is slightly more variability among Rep = 1 than Rep = 2. But is the difference big enough to violate the assumption of equal variances? In the final column are the standard errors of the means for each group. Whilst the standard deviations measure the variability in the data the standard errors of the means measures how confident we are in the estimates of the means. As we collect more data the standard error of the mean gets smaller as we get more confident in the mean estimate and in fact the formula for the standard error of the mean = standard deviation / square root of N In this case the standard error of the mean for V1Mass when Rep = 1 is 20.953 whilst for Rep = 2 it is 17.087.

The second SPSS output table contains details of the test itself and can be seen below:

Independent Samples Test										
		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
V1Mass	Equal variances assumed	1.547	.216	-1.780	118	.078	-48.117	27.037	-101.657	5.424

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