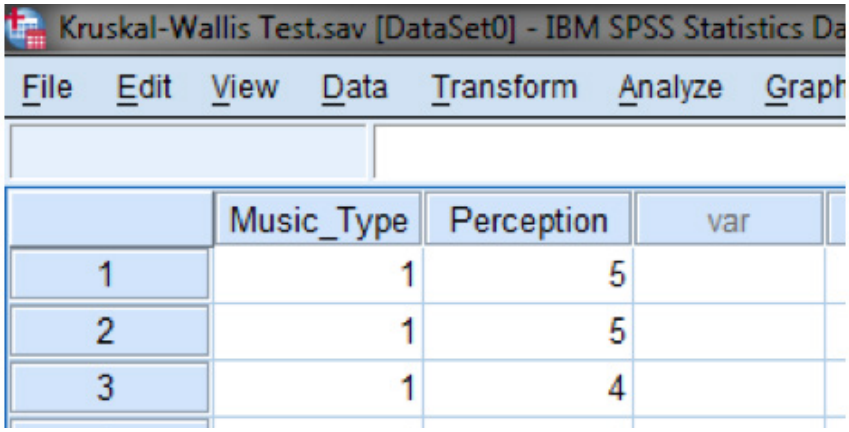
Kruskal-Wallis Test

The Kruskal-Wallis Test is used when you want to test to see if there is a significant difference between two or more samples but the assumption for the One-Way ANOVA are not met, either the data is not normally distributed or the data is at an ordinal level of measurement. To explore this technique in SPSS, let's look at the following example.

Example:

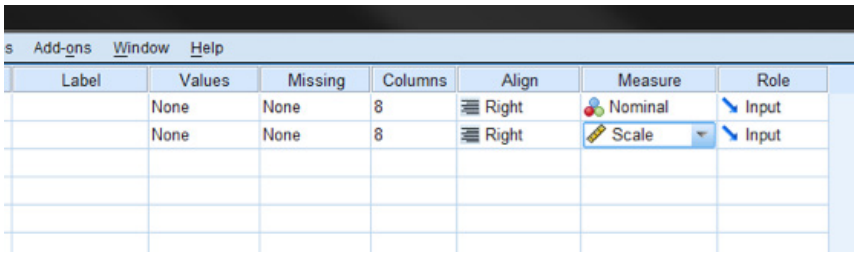
A study was done to see if music type (1 = Country, 2 = Classic, 3 = Rock, and 4 = Jazz) had an effect on students perception of their performance on an in-class exam when students listened while taking the exam. A class of 40 students were given an exam and were asked to listen to one of four types of music with head phones during the exam. Ten students listened to each type of music. They were ask to rate how well they thought they performed on the exam at the end on a scale of 1 to 5 with 1 being the worst and 5 being the best. Using the data below, we want to determine if there is a statistically significant effect on students perception of their performance due to the type of music listened to.

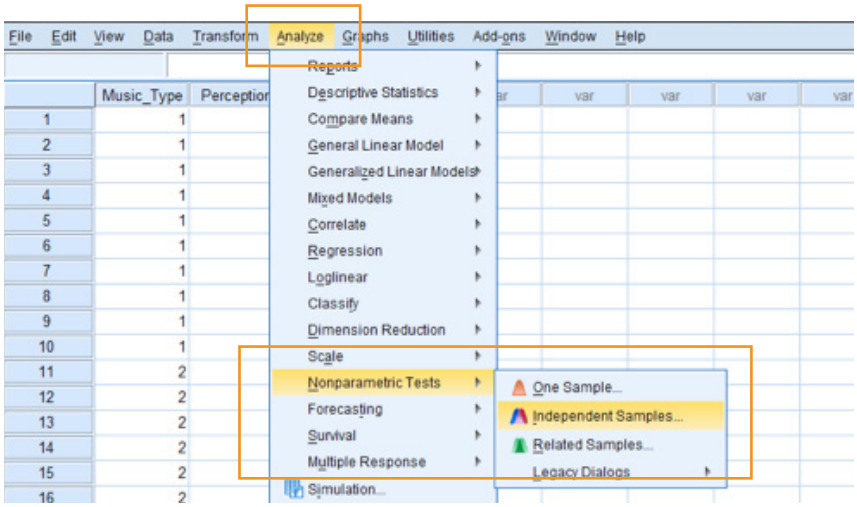
Music Type	Perception of Performance
1	5
1	5
1	4
1	3
1	4
1	5
1	4



The first step to performing the analysis in SPSS is to enter the data. The data is entered in two columns, one for Music Type and one for Perception. Please review the data entry tutorial for questions on data entry.

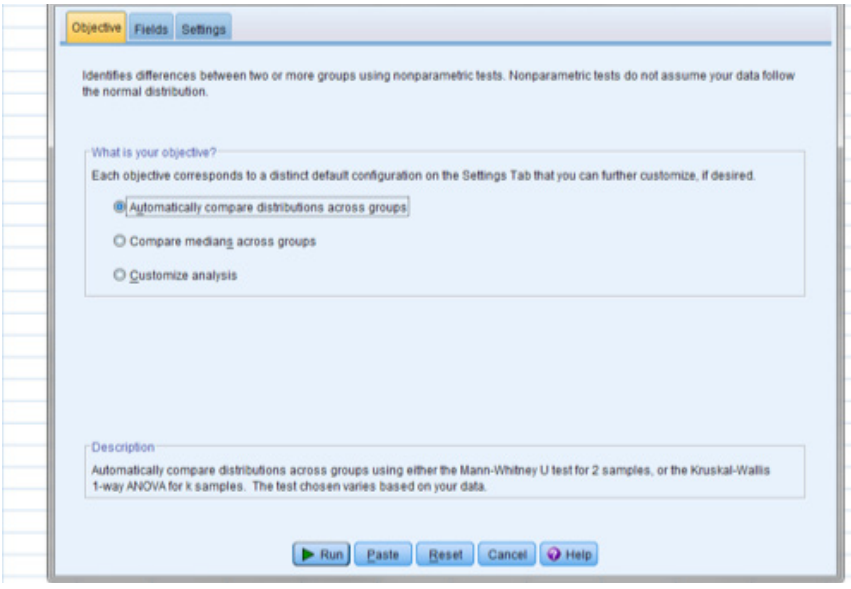
The Kruskal-Wallis Test requires the assignment of the level of measurement be assigned for each of the variables in the ***Measure*** column in the variable view tab. Music Type is at the ***nominal*** scale and Perception is Interval but in SPSS both Interval and Ratio are called ***scale***.

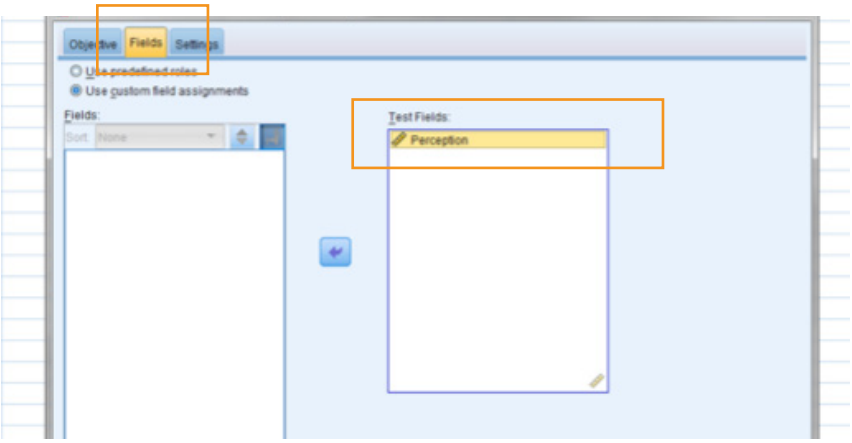




Once the measure is set, the analysis is run by selecting Analyze – Nonparametric – Independent Samples.

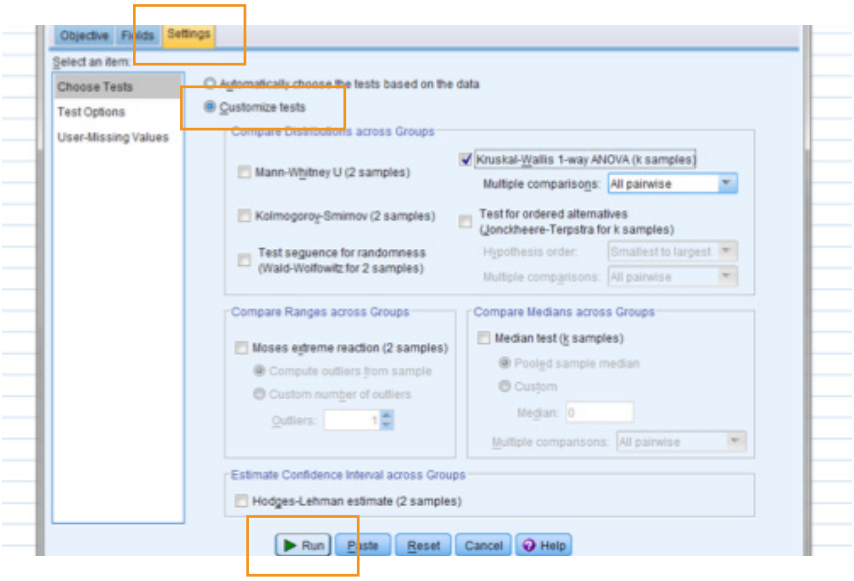
The Nonparametric Tests Two or More Independent Samples box will open. There are ***three tabs*** at the top of the box. Objective is the first and the default setting of Automatically compare distributions across groups will be selected.

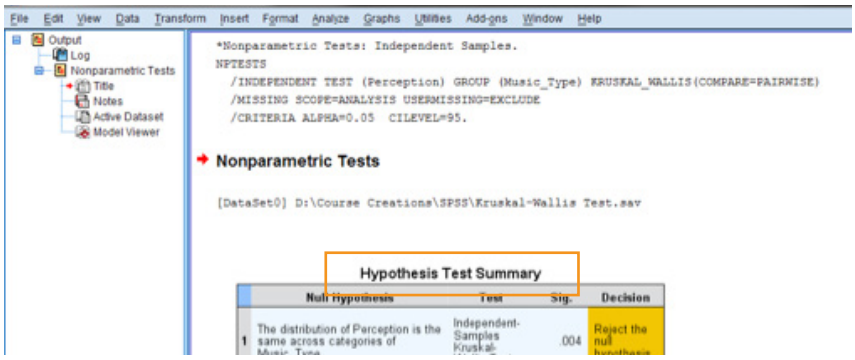




Select the second tab, Fields. In this tab move Perception to the Test Fields box and the Music Type to the Groups box.

The last tab is the Settings tab. In this tab, first select Customize Test and then Kruskal-Wallis 1-way ANOVA K samples. Then click Run.





The Hypothesis Test Summary is displayed in the output window. To get a detailed view for interpretation, double click on the Hypothesis Test Summary.

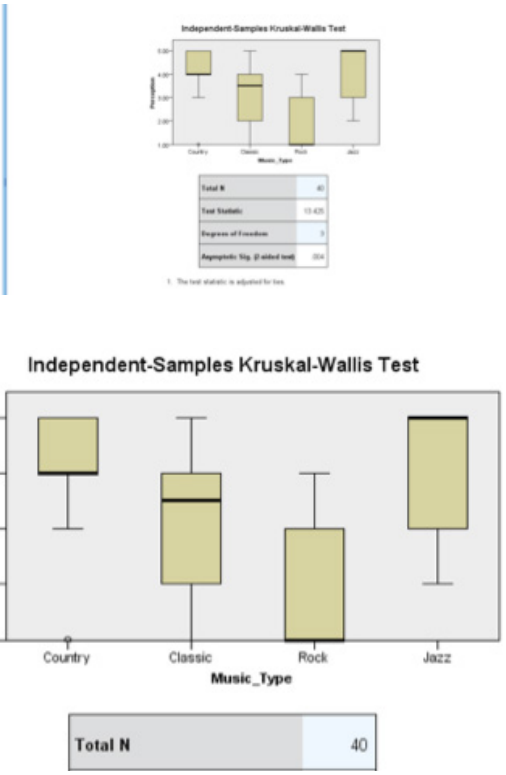
A pop-up output window will open with the results of the test.

The left side of the screen is the Hypothesis Test Summary and the right is a more detailed look at the test.

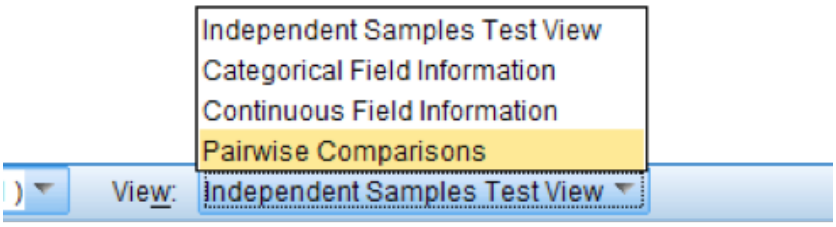
Hypothesis Test Summary

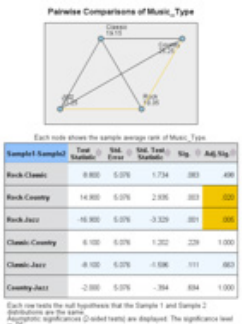
	Null Hypothesis	Test	Sig.	Decision
1	The distribution of Perception is the same across categories of Music_Type.	Independent-Samples Kruskal-Wallis Test	.004	Reject the null hypothesis.

Asymptotic significances are displayed. The significance level is .05.



The p-value (Asymptotic Sig. (2-sided test) = .004) shows there is a statistically significant effect on the perception of student performance due to the type of music listened to. To see which levels of the independent variables are significantly different from each other, the Pairwise Comparisons will need to be selected under View at the bottom of the pop-up window.

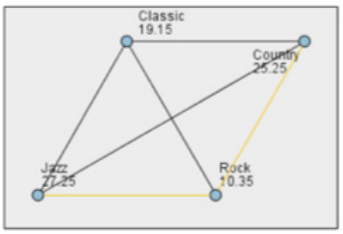




A separate pop-up window will open, the right side of the screen will have the detailed report.

The detailed report allows us to see which types of music are statistically different. The p-values for Rock – Country and Rock – Jazz show significant findings (they are less than .05). This implies that there is a statistically significant difference between student perception on exams when listening to Rock and Country and Rock and Jazz music.

Pairwise Comparisons of Music_Type



Each node shows the sample average rank of Music_Type.

Sample1-Sample2	Test Statistic	Std. Error	Std. Test Statistic	Sig.	Adj.Sig.
Rock-Classic	8.800	5.076	1.734	.083	.498
Rock-Country	14.900	5.076	2.935	.003	.020
Rock-Jazz	-16.900	5.076	-3.329	.001	.005
Classic-Country	6.100	5.076	1.202	.229	1.000
Classic-Jazz	-8.100	5.076	-1.596	.111	.663
Country-Jazz	-2.000	5.076	-.394	.694	1.000

Each row tests the null hypothesis that the Sample 1 and Sample 2 distributions are the same.
Asymptotic significances (2-sided tests) are displayed. The significance level is .05.