

## Mann-Whitney U Test for Independent Samples

This test is similar to an independent groups t-test, however, the dependent variable is measured on an ordinal scale (ranked data). This test is used to test for significant differences between two conditions of an independent variable in an experiment where the dependent variable involves ranked data.

Suppose for example a sports psychologist (also interested in gerontology) wanted to find out if there was a difference in the finishing position between a group of professional golfers who qualified for the senior pro tour (age 50 and above) and a group of professional golfers who were on the regular pro tour (age 49 and below) in a golf tournament that contained both young and older professional golfers. The researcher recorded the finishing positions (rank order) of a number of golfers who played in the tournament and obtained the following results for their finishing positions in the tournament.

### Finishing Positions of Players

<b>On Regular Tour (age 49 &amp; below)</b>		<b>On Senior Tour (age 50 &amp; above)</b>	
	<b>Finished</b>		<b>Finished</b>
Tiger Woods	2	Arnold Palmer	10
Tom Lehman	5	Jack Nicholas	4
Payne Stewart	1	Hale Irwin	8
John Daly	6	Ray Floyd	7
Ernie Els	3	Gary Player	9

1. Logon to system
2. **Click Start > Programs > SPSS for Windows > SPSS 10.1 for Windows.** At this point a window will appear asking you what you would like to do. Click on the circle next to Type in Data (2<sup>nd</sup> option in list) and then click **OK** at the bottom of the window.
3. A Data Editor will appear. Look in the lower left corner of the screen. You should see a **Data View** tab and to the right of it a **Variable View** tab. The **Variable View** tab will be used first for the Data **Definition** Phase of creating a data file. The **Data View** tab will be used to actually enter the raw numbers listed above. (See pages 1-3 for a more detailed explanation of creating data files.)

## DATA DEFINITION PHASE

4. Click on the **Variable View** tab in the lower left corner. A new screen will appear with the following words at the top of each column.  
**Name** Type Width Decimals **Label Values** Missing Columns Align Measure
5. Click on the white cell in **Row 1** under the word **Name** and type in the word **Tour**
6. Click on the white cell in **Row 1** under the word **Label** and type in **Tour**. (Doing this will provide you with a more expansive label in the results output).
7. Click on the white cell in **Row 1** under the word **Value**. The word none will appear along with a small grey box to the right.
  - a. Click on the small grey box and a Value Labels window will appear
  - b. Click on the white box next to the word **Value**, type in the number **1**
  - c. Click on the white box next to the word **Value Label** and type in **Regular Tour**
  - d. Click on **Add** button: 1 = "Regular Tour" will appear in bottom white box
  - e. Click on the white box next to the word **Value**, type in the number **2**
  - f. Click on the white box next to the word **Value Label** and type in **Senior Tour**
  - g. Click on **Add** button: 2 = "Senior Tour" will appear in bottom white box also
  - h. Click **OK**

8. Click on the white cell in **Row 2** under the word **Name** and type in the word **Finish**
9. Click on the white cell in **Row 2** under the word **Label** and type in **Finishing Position**. (Doing this will provide you with a more expansive label in the results output).

## DATA ENTRY PHASE

10. Click on the **Data View** tab in the lower left corner. The data **view** screen will now appear with Column 1 named **Tour** and Column 2 named **Finish**.
11. Enter the data for each of the 5 players on the two tours as follows. Mouse to the top cell under the first column which is **Tour** and enter the following:

1 tab 2  
 1 tab 5  
 1 tab 1  
 1 tab 6  
 1 tab 3  
 2 tab 10  
 2 tab 4  
 2 tab 8  
 2 tab 7  
 2 tab 9

The ones and twos in the first column are the codes for which tour the golfer is on where 1 = Regular Tour and 2 = Senior tour. The numbers in the second column represent the golfer's finishing position in the golf tournament.

## Data Analysis

1. Click on **Analyze** at top of screen then
  - a. Click on **Non-Parametric** Tests then
  - b. Click on **2 Independent Samples**
2. Highlight the dependent variable which is **finish** by clicking on it then
  - a. Click on **arrow >** to transfer this name to the **Test Variable List** box
3. Highlight the independent variable which is **Tour** by clicking on it then
  - a. Click on **arrow >** to transfer this name to the **Group Variable** Box. The following should then appear **Tour [? ?]**
4. Click on **Define** Groups button
  - a. Type in a **1** in the **Group 1** box
  - b. Click on **Group 2** box and enter a **2**
  - c. Click **Continue** button
5. Click on White square next to Mann-Whitney U to place a check mark in the box if one is not already there.
6. Click on the **options** button
7. Click on white square next to **Descriptives** to place a check mark in the box
  - a. Click **continue** button
8. Click **OK**. Doing this will result in analysis being conducted. These results are below.

**Ranks**

	Tour	N	Mean Rank	Sum of Ranks
Finishing Position	Regular	5	3.40	17.00
	Senior	5	7.60	38.00
	Total	10		

**Test Statistics<sup>b</sup>**

	Finishing Position
Mann-Whitney U	2.000
Wilcoxon W	17.000
Z	-2.193
Asymp. Sig. (2-tailed)	.028
Exact Sig. [2*(1-tailed Sig.)]	.032 <sup>a</sup>

a. Not corrected for ties.

b. Grouping Variable: Tour

9. For the problem above the null and alternative hypothesis are spelled out below:

$H_{null}$ : There will be no difference in the finishing rank positions of professional golfers on the senior tour and professional golfers on the regular tour when playing in a common tournament.

$H_{alt}$ : There will be a difference in the finishing rank positions of professional golfers on the senior tour and professional golfers on the regular tour when playing in a common tournament.

10. **Interpretation and APA writing template for Results Above:**

A Mann-Whitney U test was conducted to determine whether there was a difference in the finishing positions of senior and regular tour golfers who played in a common golf tournament. Results of that analysis indicated that there was a difference,  $z = -2.1934$ ,  $p < .05$  with golfers on regular tour finishing higher in the tournament than golfers on the senior tour.