MANN-WHITNEY U TEST

This test is used to compare the results of a treatment on a randomly assigned group of subjects (from a between groups design)

A researcher wants to know if extensive training will improve a participant's score obtained when firing arrows at a board.

The results are as follows:

Group 1 (No Training)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**		
Score	4	10	12	18	7	13	12	2	9	27		
Group 2 (Training)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Score	21	26	20	22	32	5	12	6	8	24	29	9

1. DETERMINE THAT CONDITIONS FOR TEST ARE ACCEPTABLE:

- Data can be ranked
- Distribution is not normal
- Each participant is allocated at random to one and only one condition

2. STATE NULL AND ALTERNATIVE HYPOTHESES:

H_o : Training has no effect on performance

H_a : Training improves performance

3. RANK SCORES FROM BOTH GROUPS TOGETHER (Lowest (1) to Highest (n))… USE MEAN OF RANKS FOR TIES:

1- 2
2- 4
3- 5
4- 6
5- 7
6- 8
7- 9, 9 } Use 7.5
8-
9- 10
10- 12, 12, 12 } Use 11
11
12
13- 13
14- 18
15- 20
16- 21
17- 22
18- 24
19- 26
20- 27
21- 29
22- 32

Group 1 (No Training)	**1**	**3**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**		
Score	4	10	12	18	7	13	12	2	9	27		
Rank	2	9	11	14	5	13	11	1	7.5	20		
Group 2 (Training)	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**	**11**	**12**
Score	21	26	20	22	32	5	12	6	8	24	29	9
Rank	16	19	15	17	22	3	11	4	6	18	21	7.5

4. CALCULATE THE SUM OF RANKS (T) IN THE *SMALLER* SAMPLE GROUP:

T = Group 1 Sum of Ranks = **93.5**

5. CALCULATE U FROM THE FOLLOWING FORMULA:

$U = n_1n_2 + [n_1(n_1 + 1)]/2 - T = \mathbf{81.5}$

where n_1 = number of participants in smaller sample and n_2 = number of participants in larger sample

6. CALCULATE U':

$U' = n_1n_2 - U = \mathbf{38.5}$

7. USING THE SMALLER VALUE OF U AND U', DETERMINE CRITICAL VALUE FROM TABLE:

Tabled value for a one-tailed test at the 5% level is 34 (and 24 at the 1% level). Since 38.5 > 34, there is insufficient evidence to reject the null hypothesis.

8. STATE CONCLUSION:

There is not enough evidence to conclude that training improves performance in this task.