t-Test for Independent Samples

Musical Performance Quality

1. Perform some preliminary computations.

Group 1		
subject i	**posttest score** X_{1i}	$(X_{1i} - \overline{X})^2$
1	17	1.45
2	16	0.04
3	21	27.10
4	10	33.57
5	18	4.87
6	16	0.04
7	13.5	5.26
8	15	0.63
9	8	60.75
10	14	3.22
11	18	4.87
12	16	0.04
13	20	17.69
14	19	10.28
15	17	1.45
16	18	4.87
17	12	14.40

count	**mean**	**sum**
N_1	$\overline{X}_1$	$\sum_{i=1}^{N_1}(X_{1i} - \overline{X}_1)^2$
17	15.79	190.53

Group 2		
subject i	**posttest score** X_{2i}	$(X_{2i} - \overline{X})^2$
1	18	4.00
2	20	16.00
3	11	25.00
4	13	9.00
5	22	36.00
6	18	4.00
7	16	0.00
8	11	25.00
9	20	16.00
10	12	16.00
11	14	4.00
12	18	4.00
13	11	25.00
14	18	4.00
15	17	1.00
16	22	36.00
17	14	4.00
18	13	9.00

count	mean	sum
N_2	$\overline{X}_2$	$\sum_{i=1}^{N_2}(X_{2i} - \overline{X}_2)^2$
18	16.00	238.00

2. Calculate a pooled estimate of standard error of the difference between two means.

$$s_{\bar{X}_1-\bar{X}_2} = \sqrt{\left(\frac{\sum x_1^2 + \sum x_2^2}{N_1 + N_2 - 2}\right)\left(\frac{1}{N_1} + \frac{1}{N_2}\right)} = \quad 1.22$$

3. Compute the t-ratio.

$$t = \frac{\bar{x}_1 - \bar{x}_2}{s_{\bar{x}_1 - \bar{x}_2}} = \quad -0.17$$

4. Evaluate the null hypothesis.

   H_o: $\mu_{x_1} = \mu_{x_2}$

   H_A: $\mu_{x_1} \neq \mu_{x_2}$

   With 33 degrees of freedom, the critical t value of 2.042 is required for significance at the .05 level for a two-tailed test.

   Since the obtained t-value is - 0.17, one would accept the null hypothesis and conclude that the difference between means is not statistically significant.