**Discussion Thread: Comparing Groups**

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Fall 2022 BUSI 820-DO3

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December 11, 2022

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Discussion Comparing Groups

D7.9.1 (a) Under what conditions would you use a one-sample t test? (b) Provide another possible example of its use from the HSB data.

D7.9.1 Short Answer (a)

 The conditions for a one-sample t-test include continuous variables from a random sample and having a normal distribution.

D7.9.1 Short Answer (b)

 An example from the HSB dataset could include comparing the mean of the dataset or a segment to an entire state's population. This example satisfies the need for requirements for a one-sample t-test.

D7.9.2 In Output 9.2

Are the variances equal or significantly different for the three dependent variables? (b) List the appropriate t, df, and p (significance level) for each t-test as you would in an article. (c) Which t-tests are statistically significant? (d) Write sentences interpreting the academic track difference between the means of grades in high school and also visualization. (e) Interpret the 95% confidence interval for these two variables. (f) Comment on the effect sizes.

D7.9.2 Short Answer (a)

The output of 9.2 shows that there is no statistical significance, assuming that Equal variances are assumed and via Levene's test sig value.

D7.9.2 Short Answer (b)

The t shows 2.697 for the math achievement test, -.903 for grades in h.s, and 2.466 for the visualization test. The degree of freedom (df) is 73. The p or significance level shows .466 for the math achievement test, .451 for grades in the h.s, and 0.13 for the visualization test. Accordingly, there is no statistical significance because these values are more significant than .05.

D7.9.2 Short Answer (c)

The statistically significant t-tests include math achievement test scores whose two-sided p is less than .05.

D7.9.2 Short Answer (d)

The academic track difference between the means of grades in high school is such that the mean for the academic track is .55, and the mean for grades in h.s is 5.68. Accordingly, the mean difference is .66 and 6.04, respectively. The academic track difference between the means of visualization is that the mean for the academic track is .55, and the mean for the visualization test is 5.2433. Accordingly, the mean difference is .058 and .45172, respectively.

D7.9.2 Short Answer (e)

The 95% confidence interval for these two variables using the One-Sample Test is .43 on the lower and .66 on the upper for the academic track. In contrast, the visualization test shows 4.3433 on the lower and 6.1434 on the upper. This means that there is a 95% confidence that the population's mean is contained within the lower and upper bounds. The 95% confidence interval indicates that 95% of the time, the mean will fall inside the interval between the high and low numbers (Freire et al., 2019).

D7.9.2 Short Answer (f)

The difference between these values represents the confidence interval and the magnitude of the experiment. Cohen's d test suggests that the effect size for these variables is quite large.

D7.9.3

Compare the results of Outputs 9.2 and 9.3. (b) When would you use the Mann–Whitney U test?

D7.9.3 Short Answer (a)

The mean for math achievement test scores is 10.75 for the regular track and 14.75 for the fast track. The mean for grades in h.s. was 5.83 for the regular track and 5.50 for the fast track. The mean visualization test is 4.26 for the regular track and 6.42 for the fast track. The group statistics reveal that the regular track for the grades in h.s. was higher than the fast track. Moreover, the fast track for the math achievement test and visualization is higher for the fast track than the regular track. The Mean Rank score for the visualization test is 33.32 for the regular track and 43.65 for the fast track. The Mean Rank score for the math achievement test is 32.11 for the regular track and 45.1 for the fast track. The Mean Rank score for grades in h.s is 39.84 for the regular track and 35.78. for the fast track. The grades in high school regular track had higher test scores but were the opposite for the visualization test and math achievement test, where the fast track scores were higher.

D7.9.3 Short Answer (b)

The Mann-Whitney U test should be used to identify if the samples come from the same population. Furthermore, the Mann–Whitney U test can be used to study the statistical significance of factors by population groups (Tai et al., 2022).

D7.9.4 In Output 9.4

What does the paired samples correlation for mother's and father's education mean? (b) Interpret/explain the results of the t test. (c) Explain how the correlation and the t test differ in what information they provide. (d) Describe the results of the r was .90 and the t was zero. (e) What if r was zero and t was 5.0?

D7.9.4 Short Answer (a)

The paired samples correlation for mothers' and fathers' education mean are 4.14 and 4.73, respectively, and means that based on the dataset, fathers have more education than mothers.

D7.9.4 Short Answer (b)

The results for the t test indicate that the correlation is .681 for fathers' and mothers' education. Accordingly, those with more education tend to marry others with comparable higher education.

D7.9.4 Short Answer (c)

The mean is .589, r is .68, t value is 2.396, df is 72, and the p-value is .019. Accordingly, the t-test indicates that the relationship is statistically significant.

D7.9.4 Short Answer (d)

Because t values represent a more significant difference between sample sets, if the t value were 0, it would indicate a perfect similarity between sample sets. Additionally, the r value represents linear trends or correlation coefficients between variables. Therefore, a higher r-value of .90 that is closer to 1 would mean that there is a smaller difference between the variables.

D7.9.4 Short Answer (e)

If the r value were zero, it would indicate no relationship between the variables. Moreover, if the t value were 5.0, it would indicate a significant difference between the variables.

D7.9.5 Compare the results of Output 9.4 with Output 9.5. (b) When would you use the Wilcoxon test?

D7.9.5 Short Answer (a)

Output 9.4 is a paired t-test, and 9.5 is a Wilcoxon test. The p-value of 9.4 is 0.19, while the p-value of 9.5 is .037. The results from both tests are similar.

D7.9.5 Short Answer (b)

You would use the Wilcoxon test when the variables and the population means are not interesting or are not normally distributed. Moreover, the Wilcoxon Rank Test is used to study the differences between two halves and to ascertain if there is a trend in the time series (Saplıoğlu & Güçlü, 2022).

References

Freire, A., Elkins, M. R., Ramos, E., & Moseley, A. M. (2019). Use of 95% confidence intervals in the reporting of between-group differences in randomized controlled trials: Analysis of a representative sample of 200 physical therapy trials. *Brazilian Journal of Physical Therapy*, *23*(4), 302–310. <https://doi.org/10.1016/j.bjpt.2018.10.004>

Saplıoğlu, K., & Güçlü, Y. (2022). Combination of wilcoxon test and scatter diagram for trend analysis of hydrological data. *Journal of Hydrology*, *612*, 128132. <https://doi.org/10.1016/j.jhydrol.2022.128132>

Tai, K., Dhaliwal, J., & Balasubramaniam, V. (2022). Leveraging mann–whitney u test on large-scale genetic variation data for analysing malaria genetic markers. *Malaria Journal*, *21*(1). <https://doi.org/10.1186/s12936-022-04104-x>