

Independent Sample and Repeated Measures t-tests

Assignment: Heiman Chapter 12, pps 300-323 pps 274-283 & 286-292

Terms you should know.

Independent sample t-test
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Dependent sample (repeated
measures) t-test
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Homogeneity of variance
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Standard error of the difference
between means.
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Pooled estimate of the population
variance
.....
.....

Formulas and Symbols You Should Know.

Two Sample t-test symbols and formulas

$$S^2_{\text{Pooled}} \dots\dots\dots$$

$$S_{\text{diff}} \dots\dots\dots$$

$$S^2_{\text{Pooled}} = \frac{SS_1 + SS_2}{df_1 + df_2} \dots\dots\dots$$

$$S_{\overline{X_1} - \overline{X_2}} = \sqrt{\frac{S^2_P}{N_1} + \frac{S^2_P}{N_2}} \dots\dots\dots$$

$$t = \frac{\overline{X_1} - \overline{X_2}}{S_{\overline{X_1} - \overline{X_2}}} \dots\dots\dots$$

Within Groups t-test symbols and formulas

$$D \dots\dots\dots$$

$$S_{\overline{D}} \dots\dots\dots$$

$$S_{\overline{D}} = \sqrt{\frac{S^2_D}{N}} \dots\dots\dots$$

$$t_{(N-1)} = \frac{\overline{D}}{S_{\overline{D}}} \dots\dots\dots$$

Concepts You Should Master

1. What is the difference between the single sample and independent sample t-test?

2. What is meant by homogeneity of variance?

3. What type of t-test would you use for each of the following experiments? Why?
 - a. An investigation of the effects of sleep deprivation on ability to memorize words comparing a group of subjects who have been deprived of sleep against a the population μ for subjects permitted to sleep an average of 8 hours.

 - b. An investigation as to whether girls of boys are more prone to household accidents.

 - c. An evaluation of the differential effectiveness of desensitization therapy on men and women.

Homework #11: Calculations You Should Master

Name: _____ (This is my work, and my work alone.)

Problem 1. Rho Dent wanted to decide if maze learning in rats required the animals to actually walk through the maze. Dent took two randomized groups of hungry rats. The groups of ten rats each were "trained" in a maze in which food was available in the goal box. One group was permitted to run or walk through the maze. Rats in the other group were placed in a small cart that was pulled through the maze by the experimenter. Both groups were then given five non-reinforced test trials where they were permitted to run or walk through the maze freely.

	N	Mean	S	S ²	SS
Walk	10	10.9	1.20	1.44	12.96
Cart	10	13.5	1.58	2.496	22.4676

1. What is your research hypothesis?
2. What is H_0 ?
3. What is H_A ?
4. What is the statistical test and df?
5. What is the significance level and its critical value?
6. What is your estimate of the pooled σ^2 ?
7. What is the Standard error of the mean?
8. What is your calculated statistic?
9. What is your statistical decision?
10. What is your conclusion?
11. What is the effect size? Based on the effect size, how do you assess the strength of the treatment?

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Problem 2. A statistics professor wanted to know if it was better to teach students by giving examples first, then explaining the theory or if was better to give the theory first and then give examples. The researcher collected data from two groups of subjects of randomly chosen subjects. Their results on a statistics test are summarized below. Can the researcher conclude that one teaching strategy was more effective than the other? If “Yes” which one is more effective?

	N	Mean	S	S ²	SS
Examples First	18	18.6	1.38	1.904	32.375
Theory First	14	17.3	1.414	2.00	26.00

1. What is your research hypothesis?
2. What is H₀?
3. What is H_A?
4. What is the statistical test and df?
5. What is the significance level and its critical value?
6. What is your best estimate of the pooled σ^2 ?
7. What is the Standard error of the mean?
8. What is your calculated statistic?
9. What is your statistical decision?
10. What is your conclusion?
11. What is the effect size? Based on the effect size, how do you assess the strength of the treatment?

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Problem 3. Pat A. Kayke wanted to know if people who said a prayer just before answering quiz questions did better on quizzes. A sample of 6 students alternatively prayed and did not pray during a statistics quiz. Their scores are reported below. Did the prayer have an effect?

Subject	Prayer	No Prayer	D	$(D - M_D)^2$
A	93	98		
B	90	94		
C	95	96		
D	92	91		
E	95	97		
F	91	97		

1. What is your research hypothesis?
2. What is H_0 ?
3. What is H_A ?
4. What is the statistical test and df?
5. What is the significance level and its critical value?
6. What is your best estimate of the population σ ?
7. What is the Standard error of the difference?
8. What is your calculated statistic?
9. What is your statistical decision?
10. What is your conclusion?
11. What is the effect size? Based on the effect size, how do you assess the strength of the treatment?

4. Using SPSS compute t-tests for evaluating the difference between men and women on the C-scores for Assertiveness and Sociability of the class data set. Attache your printout to this page.
 - a. For Assertivness.
 - i. Who has higher scores?
 - ii. What is the t-score?
 - iii. Is this a practically significant value? Why do you say this?
 - b. For Sociability.
 - i. Who has higher scores?
 - ii. What is the t-score?
 - iii. Is this a practically significant value? Why do you say this?