

AS1: Assignment 1, ANOVA

RESEARCH SCENARIO:

1. A randomized study was conducted comparing the effects of repetition on recall. Conditions included the following number of repetitions per list of words: 5 times, 10 times, 15 times, and 20 times.

(a) What is (are) the factor(s) in this study? # of repetitions per list of words

(b) How many levels (if any) does (do) the factor(s) have? _4 levels (5,10,15,20 times) _____

(c) What is the dependent variable? _Recall of the words _____

2. What is the research design? __Randomized controlled trial _____

3. What is the appropriate hypothesis test to analyze these data? ___One way Anova _____

4. In which source of variance would you expect the treatment effect?

In this study, the treatment would be expected in the between-group variance or the variance between the different levels of repetition. Specifically we're interested in whether the mean recall scores differ significantly across the different levels of repetition, which would suggest a treatment effect.

Below is an SPSS ANOVA: Based on these results, please answer a-f

ANOVA

VAR00001

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	16.267	2	8.133		.007
Within Groups	37.100	27	1.374		
Total	53.367	29			

Multiple Comparisons

Dependent Variable: VAR00001

Bonferroni

(I) VAR00002	(J) VAR00002	Mean Difference (I- J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1.00	2.00	-1.00000	.52423	.201	-2.3381	.3381
	3.00	-1.80000*	.52423	.006	-3.1381	-.4619
2.00	1.00	1.00000	.52423	.201	-.3381	2.3381
	3.00	-.80000	.52423	.416	-2.1381	.5381
3.00	1.00	1.80000*	.52423	.006	.4619	3.1381
	2.00	.80000	.52423	.416	-.5381	2.1381

*. The mean difference is significant at the 0.05 level.

(a) What is the value of the variance between? 8.133

(b) What is the value of the variance within? 1.374

(c) What is the F value (I know it is not there, calculate it): 5.919

(d) Please write the statistical statement for the above SPSS ANOVA results:

Answer: F(2,27) = 5.919, p = .007

(e) Is your F test significant? Yes x No

(f) If yes, please note where the significance is found:

There is significant difference between group 1 and group 3

RESEARCH SCENARIO 2:

A researcher hypothesizes that exam performance is affected by the amount of time that a student reviews the quiz material immediately prior to the quiz. He randomizes his sample of $n=30$ participants to a 10 minutes condition, a 20 minutes condition, and a 30 minutes condition, after which all students take the quiz. The data are below:

10 m	20 m	30 m
86	94	92
78	91	91
55	82	68
88	15	65
77	85	78
65	72	81
60	78	83
64	74	69
72	70	74
84	83	83

1. What is the factor in this study? Amount of times spent reviewing quiz material prior taking the quiz

2. What is the dependent variable in this study? _Exam Performance

3. What is the research hypothesis?

The amount of times spent reviewing quiz material immediately prior to the quiz will have a significant effect on exam performance, with longer review times resulting in higher quiz scores.

4. What is the null hypothesis?

There will be no significant difference in exam performance between the three review times conditions.

5. What is the name of the research design? Randomized between subjects design

6. Run the appropriate SPSS test and cut and paste your SPSS results here:

- Output
- Oneway
 - Title
 - Notes
 - Active Dataset
 - Descriptives
 - ANOVA
 - ANOVA Effect Size
 - Post Hoc Tests
 - Title
 - Multiple Comp
 - Homogeneous:
 - Title
 - VAR000C

Descriptives

	N	Mean	Std. Deviation	Std. Error	95% Confidence Interval for Mean		Minimum	Maximum
					Lower Bound	Upper Bound		
1.00	10	72.9000	11.52244	3.64372	64.6573	81.1427	55.00	88.00
2.00	10	74.4000	22.28702	7.04777	58.4568	90.3432	15.00	94.00
3.00	10	78.4000	9.35949	2.95973	71.7046	85.0954	65.00	92.00
Total	30	75.2333	15.10351	2.75751	69.5936	80.8731	15.00	94.00

ANOVA

	Sum of Squares	df	Mean Square	F	Sig.
Between Groups	161.667	2	80.833	.338	.716
Within Groups	6453.700	27	239.026		
Total	6615.367	29			

ANOVA Effect Sizes^{a,b}

VAR00001	Point Estimate	95% Confidence Interval	
		Lower	Upper
Eta-squared	.024	.000	.161
Epsilon-squared	-.048	-.074	.099
Omega-squared Fixed-effect	-.046	-.071	.096
Omega-squared Random-effect	-.023	-.034	.051

- a. Eta-squared and Epsilon-squared are estimated based on the fixed-effect model.
- b. Negative but less biased estimates are retained, not rounded to zero.

Post Hoc Tests

Multiple Comparisons

Dependent Variable: VAR00001
Scheffe

(I) VAR00002	(J) VAR00002	Mean Difference (I-J)	Std. Error	Sig.	95% Confidence Interval	
					Lower Bound	Upper Bound
1.00	2.00	-1.50000	6.91413	.977	-19.4078	16.4078
	3.00	-5.50000	6.91413	.731	-23.4078	12.4078
2.00	1.00	1.50000	6.91413	.977	-16.4078	19.4078
	3.00	-4.00000	6.91413	.847	-21.9078	13.9078

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3.00	1.00	5.50000	6.91413	.731	-12.4078	23.4078
	2.00	4.00000	6.91413	.847	-13.9078	21.9078

Homogeneous Subsets

VAR00001

Scheffe^a

VAR00002	N	Subset for alpha = 0.05
1.00	10	72.9000
2.00	10	74.4000
3.00	10	78.4000
Sig.		.731

- Means for groups in homogeneous subsets are displayed.
- a. Uses Harmonic Mean Sample Size = 10.000.

7. Based on your SPSS results, what is MS between? 80.833

8. Based on your SPSS results, what is MS within? 239.026

9. What is the F value? 0.338

10. Please write the "statistical statement" for your SPSS analysis:

Answer: $F(2, 27) = 0.338, p = 0.716$.

11. Were your results significant? Yes _____ No x

12. If yes, which groups showed a statistical difference?
