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Exam 2

PS306, Spring 1999

As always, the Skidmore Honor Code is in effect. Keep your eyes fixed on your own exam. Work through the questions as carefully as you can, keeping in mind that the point value of each question is my hint as to how long I think you should work on the question. Good luck!

1a. Suppose that you are interested in conducting an experiment on the effects of sleep deprivation and task difficulty on performance. You operationally define performance as the time it takes a participant to complete the task correctly (better performance = faster time to complete the task). You decide that you want to use 5 levels of sleep deprivation. You also decide to use 3 levels of difficulty: easy tasks, moderate tasks, and difficult tasks. (You pre-test the tasks with a group of participants to determine the level of task difficulty.) You decide to use a mixed design with task difficulty repeated and sleep deprivation a between (independent groups) factor. Because of power considerations, you want to have a minimum of 30 scores in each cell. Describe the study you would conduct in sufficient detail that I can tell that you know how to conduct such a study. Flesh out the details of the experiment, including (at minimum) the following: (1) the exact levels of sleep deprivation you would use; (2) how many people you would need to complete your study; (3) how you would run them through the study;

and, (4) produce a figure or table to illustrate a set of results that you think you might obtain from this study and what the implications of the results would be in terms of the effects found in an ANOVA (i.e., main effects and interaction). [25 pts]

Area reserved for a figure or table illustrating results and implications of the ANOVA.

2. Suppose that you have conducted a completely between (independent groups) 5 [Factor A] X 6 [Factor B] design with 10 scores per cell. Complete the following source table, and answer the following related questions. [10 pts]

SOURCE	SS	df	MS	F
Factor A	16			
Factor B	100			
A X B	400			
Error (Within)	1080			
Total	1596			

- What would be your best estimate of the population variance (σ^2)?
- If the design were modified to be a completely within design, what impact would you expect on the Mean Square error?

3. Several researchers have investigated the encoding specificity effect. The general finding is that people remember best when the testing situation is as similar as possible to the learning situation. (Thus, because the typical testing situation is a relatively quiet classroom, you'd best study/learn under conditions as similar to the testing situation as possible.) Dr. Julie Ard was interested in the effects of music on studying, as well as the encoding specificity effect. That is, she was interested in the extent to which the similarity of the study and test situations affected performance. To test her hypotheses, she used five acquisition conditions (studying while listening to: heavy metal, rock, classical, jazz, or blues). People in these groups studied material while listening to a particular type of music. After a brief delay, half of the people in each condition were tested under identical music (same) and half of the people were tested with no music (different). The dependent variable was the percentage score on the test (100 = perfect performance). Complete the analysis and interpret the results below as completely as possible. [25 pts.]

ANOVA Table for Score

	DF	Sum of Squares	Mean Square	F-Value	P-Value	Lambda	Power
Music		1738.900			<.0001	322.682	1.000
Test		529.000			<.0001	98.165	1.000
Music * Test		207.100			<.0001	38.431	1.000
Residual		485.000					

Means Table for Score
Effect: Music * Test

	Count	Mean	Std. Dev.	Std. Err.
Blues, Different	10	82.700	1.252	.396
Blues, Same	10	88.100	2.132	.674
Classical, Different	10	88.300	3.529	1.116
Classical, Same	10	94.800	2.150	.680
Heavy Metal, Different	10	79.200	3.011	.952
Heavy Metal, Same	10	80.200	2.394	.757
Jazz, Different	10	85.800	3.048	.964
Jazz, Same	10	94.300	1.889	.597
Rock, Different	10	84.500	1.179	.373
Rock, Same	10	86.100	1.287	.407

4. Dr. Mai Ayes was interested in studying the effects of task difficulty and sleep deprivation on performance, as you did in the first question, but she's decided to use a completely between (independent groups) design. The amounts of sleep deprivation that she decided to use are: 24, 36, 48, 60, and 72 hours. That is, participants were awake without sleep for one of those periods before being tested (on either an easy, a moderate, or a difficult task). She measured performance on a 9-point scale (1 = lousy performance <-> 9 = excellent performance). Analyze these data as completely as you can. [20 pts]

ANOVA Table for Score

	DF	Sum of Squares	Mean Square	F-Value	P-Value	Lambda	Power
Hours Deprived	4	65.813	16.453	43.298	<.0001	173.193	1.000
Task Difficulty	2	120.027	60.013	157.930	<.0001	315.860	1.000
Hours Deprived * Task Difficulty	8	.107	.013	.035	>.9999	.281	.058
Residual	60	22.800	.380				

Means Table for Score

Effect: Hours Deprived * Task Difficulty

	Count	Mean	Std. Dev.	Std. Err.
24 Hours, Difficult	5	4.000	.707	.316
24 Hours, Easy	5	7.200	.447	.200
24 Hours, Moderate	5	6.200	.447	.200
36 Hours, Difficult	5	2.600	.548	.245
36 Hours, Easy	5	5.600	.548	.245
36 Hours, Moderate	5	4.600	.548	.245
48 Hours, Difficult	5	2.600	.548	.245
48 Hours, Easy	5	5.600	.548	.245
48 Hours, Moderate	5	4.600	.548	.245
60 Hours, Difficult	5	1.800	.837	.374
60 Hours, Easy	5	4.800	.837	.374
60 Hours, Moderate	5	3.800	.837	.374
72 Hours, Difficult	5	1.400	.548	.245
72 Hours, Easy	5	4.400	.548	.245
72 Hours, Moderate	5	3.400	.548	.245