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Exam 2

PS 306, Spring 2003

As always, the Skidmore Honor Code is in effect. Read each question carefully and answer it completely. Show all your work. In order to ensure that you complete the exam on time, allocate about one minute per point on the exam. Good Luck!

1. Yael is always quick to spot confounds in which a repeated measures design is not properly counterbalanced. Using a specific example that you create, illustrate *why* it is a confound to conduct a repeated measures experiment in which you use the same order for all participants. Be as explicit as you can. Then tell me what impact counterbalancing will have on the variability of scores within a condition if there are order or carryover effects. [10 pts]

2. For the following designs, tell me exactly how many participants would be needed. [15 pts]

a. In a 3x4 completely between (independent groups) design with $n = 20$.

b. In a 3x7 completely within (repeated measures) design with a minimum n of 25.

c. In a 3x6 completely within (repeated measures) design with a minimum n of 30.

d. In a 4x4 mixed design, with the first factor between (independent groups) and the second factor within (repeated measures). Assume a minimum n of 25.

e. In a 5x7 mixed design, with the first factor between (independent groups) and the second factor within (repeated measures). Assume a minimum n of 20.

3. Suppose that you are interested in evaluating the effectiveness of different teaching techniques (e.g., Method A, Method B). What are two possible ways to avoid confounding teacher and technique? Which way seems most effective to you and why? [5 pts]

4. Dr. Alucard has a total of 60 bats at his disposal, 30 male and 30 female. He is interested in testing the effectiveness of a drug (Hearmore) that claims to permanently improve auditory abilities. To test the effectiveness of the drug, Dr. Alucard has decided to use a maze that must be traversed by the bats in total darkness, using only their sonar abilities. After training the bats to fly from one end of the maze to the other to obtain food, Dr. Alucard wants to use four different diameter wires (.25, .5, 1.0, and 1.5 mm) to construct the mazes through which the bats must fly. Each maze is constructed by stringing the wires of a particular diameter from floor to ceiling. (Think of the kitten video at the beginning of the semester.) Dr. Alucard intends for each bat to fly through each of the mazes as a means of assessing auditory discrimination abilities.

Dr. Alucard decides that the best dependent variable to use is the number of times that a bat touches one of the wires in the maze. Thus, more touches indicate worse auditory discrimination. As Dr. Alucard's research assistant, you are expected to complete the design of this study, based on the rough ideas that Dr. Alucard has established. Do so now, providing *explicit detail* about exactly how you would administer this experiment (nature of the design, procedure, etc.). [20 pts]

5. As you may recall, Schacter has studied the number of speech fillers (“um,” “ah,” etc.) found in the speech of faculty from different areas under different circumstances. Suppose that he had looked at faculty from 4 different departments (English, History, Chemistry, and Biology). Suppose, also, that he had looked at the number of fillers found in 3 different social situations (Classroom Lecture, Conference Lecture (to peers), and Party situation), sampled over a 30-minute period in each situation. He might have found data that would lead to a source table such as that seen below. Complete the source table and interpret the results from this study as completely as you can. [10 pts]

ANOVA Table for Speech Fillers

	DF	Sum of Squares	Mean Square	F-Value	P-Value	Lambda	Power
Situation			924.4		<.0001	156.579	1.000
Discipline				8.1	.0002	24.423	.992
Situation * Discipline		291.6			.0021	24.694	.964
Residual		566.8					

Means Table for Speech Fillers

Effect: Situation * Discipline

	Count	Mean	Std. Dev.	Std. Err.
Classroom, Biology	5	2.200	1.304	.583
Classroom, Chemistry	5	5.600	2.074	.927
Classroom, English	5	12.000	5.148	2.302
Classroom, History	5	11.800	6.380	2.853
Conference, Biology	5	10.800	2.168	.970
Conference, Chemistry	5	8.400	1.140	.510
Conference, English	5	12.200	4.147	1.855
Conference, History	5	17.000	3.464	1.549
Party, Biology	5	22.600	2.074	.927
Party, Chemistry	5	19.800	4.207	1.881
Party, English	5	22.400	2.702	1.208
Party, History	5	20.000	2.000	.894

6. Dr. Alphonse Dente studies taste perception. In a recent study, he was interested in studying the impact of amount of salt added to a tomato sauce on ratings of the quality of the gustatory experience. He used three levels of salt (1 tablespoon per quart, 2 tablespoons per quart, and 3 tablespoons per quart). Other than the level of salt, the composition of the tomato sauce was identical. An equal amount of one sauce with one of the three salt levels was poured over spaghetti and served to each participant. Because Dr. Dente thought that the accompanying beverage might have an impact on the ratings of the food quality, one third of the participants for each level of salt consumed a beer along with their spaghetti, one third of the participants consumed a glass of wine, and one third of the participants consumed a glass of water. The dependent variable was a rating by each participant of the overall quality of the spaghetti using a 9-pt rating scale (1 = not so good and 9 = great). Complete the source table below and interpret the results of this study as completely as you can. [10 pts]

ANOVA Table for Rating

	DF	Sum of Squares	Mean Square	F-Value	P-Value	Lambda	Power
Salt		89.9			<.0001	139.517	1.000
Beverage				53.8	<.0001	107.655	1.000
Salt * Beverage			.49		.5591	3.034	.216
Residual		23.2					

Means Table for Rating

Effect: Salt * Beverage

	Count	Mean	Std. Dev.	Std. Err.
1, Beer	5	8.000	.707	.316
1, Water	5	6.000	.707	.316
1, Wine	5	8.200	.837	.374
2, Beer	5	7.400	.548	.245
2, Water	5	4.200	.837	.374
2, Wine	5	7.200	.837	.374
3, Beer	5	5.000	1.000	.447
3, Water	5	2.200	.837	.374
3, Wine	5	4.800	.837	.374