

Please be sure to use your actual Skidmore student ID#. If you don't know it, I've got it on the class list, so I can give it to you. Read each question carefully and answer questions completely. Show all your work. Thanks for a pleasant semester. Have a wonderful summer!

1. Dr. Noah Weisser was interested in investigating the effects of sleep deprivation and alcohol on driving ability. To that end, he conducted a 3x3 independent groups study. Participants were given identical 32 oz. drinks that could contain 2, 4, or 8 ozs. of vodka (with the remainder of the glass filled with orange juice). Within each level of alcohol, one-third of the participants were deprived of sleep for 2 days, one-third were deprived of sleep for 3 days, and the final third were deprived of sleep for 4 days. Each of the participants operated a driving simulator for 30 minutes, during which the number of driving errors (objects hit, crossing into the oncoming lane, etc.) were recorded. Complete the analysis shown below and interpret the results as completely as you can. [20 pts]

ANOVA Table for Errors

| | DF | Sum of Squares | Mean Square | F-Value | P-Value | Lambda | Power |
|---------------------|----|----------------|-------------|---------|---------|---------|-------|
| Alcohol | | | 344.264 | | <.0001 | 335.932 | 1.000 |
| Sleep Dep | | | 230.889 | | <.0001 | 225.301 | 1.000 |
| Alcohol * Sleep Dep | | | 23.306 | | <.0001 | 45.483 | 1.000 |
| Residual | | | 2.050 | | | | |

Means Table for Errors

Effect: Alcohol * Sleep Dep

| | Count | Mean | Std. Dev. | Std. Err. |
|---------------|-------|--------|-----------|-----------|
| 2 oz., 2 days | 8 | 1.375 | 1.061 | .375 |
| 2 oz., 3 days | 8 | 3.250 | 1.035 | .366 |
| 2 oz., 4 days | 8 | 6.375 | 1.188 | .420 |
| 4 oz., 2 days | 8 | 3.500 | .926 | .327 |
| 4 oz., 3 days | 8 | 6.875 | .991 | .350 |
| 4 oz., 4 days | 8 | 7.750 | .707 | .250 |
| 8 oz., 2 days | 8 | 7.250 | 1.282 | .453 |
| 8 oz., 3 days | 8 | 9.500 | 1.195 | .423 |
| 8 oz., 4 days | 8 | 16.500 | 3.071 | 1.086 |

2a. Two researchers were interested in studying the effects of reward magnitude on performance. Both researchers draw from the same pool of participants, use the same total number of participants (24), the same type of reward and reward magnitudes (\$1, \$5, \$20), the same apparatus, the same task, and the same performance measure (DV). One researcher uses an independent groups design and, on the basis of the results, cannot reject the null hypothesis (that reward has no effect on performance). The other researcher uses a repeated measures design and finds a statistically significant effect of reward magnitude — larger rewards lead to better performance. Assume that neither study has a major flaw (e.g., repeated measures design is properly counterbalanced). There are three fundamental reasons why the two researchers might have reached different conclusions. One reason concerns the sensitivity of the test of the null hypothesis. Another reason concerns the nature of the participant's experience in the two studies. A final reason has to do with the tentativeness of hypothesis testing, regardless of whether or not a researcher rejects the null hypothesis. Provide me with a clear explanation of the reasons that the two researchers may have reached such different conclusions. Would you trust the results of one study more than the other? Why? [15 pts]

2b. Finally, complete the source tables for the two experiments, as seen below. {Remember, the RM design is more efficient, so participants generate more than one piece of data.} [10 pts]

Independent Groups Design:

| Source | SS | df | MS | F |
|---------------------------|----|----|----|--------------------------|
| Between Treatments | 24 | | | $F_{\text{Crit}} = 3.47$ |
| Within Treatments (Error) | | | | |
| Total | 98 | | | |

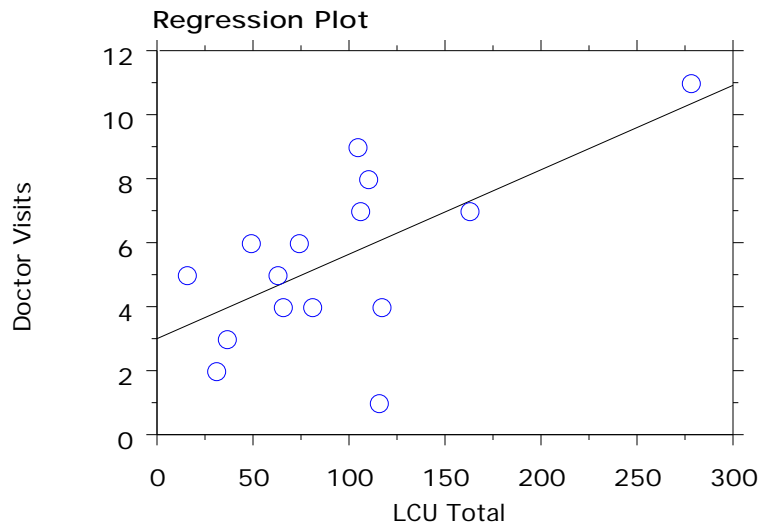
Repeated Measures Design:

| Source | SS | df | MS | F |
|--------------------|-----|----|----|--------------------------|
| Between Treatments | 14 | | | $F_{\text{Crit}} = 3.20$ |
| Between Subjects | 88 | | | |
| Error (Residual) | | | | |
| Total | 194 | | | |

3. Studies have suggested that the stress of major life changes is related to subsequent physical illness. Holmes and Rahe (1967) devised the Social Readjustment Rating Scale (SRRS) to measure the amount of stressful change in one's life. Each event is assigned a point value, which measures its severity. For example, at the top of the list, death of a spouse is assigned 100 life change units (LCU). Divorce is 73 LCUs, retirement is 45, change of career is 36, the beginning or end of school is 26, and so on. The more life change units one has accumulated in the past year, the more likely he or she is to have an illness. The following StatView analyses show the results from a hypothetical set of data. Interpret these results as completely as you can. For these data, if a person had accumulated 100 LCUs, how many doctor visits would you predict? If a person had accumulated 400 LCUs, how many doctor visits would you predict? [10 pts]

Regression Summary
Doctor Visits vs. LCU Total

| | |
|--------------------|-------|
| Count | 15 |
| Num. Missing | 0 |
| R | .637 |
| R Squared | .406 |
| Adjusted R Squared | .360 |
| RMS Residual | 2.135 |



ANOVA Table
Doctor Visits vs. LCU Total

| | DF | Sum of Squares | Mean Square | F-Value | P-Value |
|------------|----|----------------|-------------|---------|---------|
| Regression | 1 | 40.469 | 40.469 | 8.877 | .0107 |
| Residual | 13 | 59.264 | 4.559 | | |
| Total | 14 | 99.733 | | | |

Regression Coefficients
Doctor Visits vs. LCU Total

| | Coefficient | Std. Error | Std. Coeff. | t-Value | P-Value |
|-----------|-------------|------------|-------------|---------|---------|
| Intercept | 2.995 | .996 | 2.995 | 3.006 | .0101 |
| LCU Total | .026 | .009 | .637 | 2.979 | .0107 |

4. OK, here's the actual data from the last lab exercise on the impact of duration on face perception. Analyze and interpret the data as completely as you can. Tell me what you would conclude from these results. (I was expecting more than 27 participants, but that's all I could find on the Zip disk.) The DV is percent hits. That is, the number of the 16 faces at each duration that were correctly identified as old divided by 16. What would you say about the results given that the average proportion of false positives was .32. (False positives occur when a new face is called old.) {Can you remember how we used false positives in an earlier lab exercise?} [15 pts]

ANOVA Table for Duration

| | DF | Sum of Squares | Mean Square | F-Value | P-Value | Lambda | Power |
|---------------------------------|----|----------------|-------------|---------|---------|--------|-------|
| Subject | 26 | 1.162 | .045 | | | | |
| Category for Duration | 2 | .611 | .305 | 26.796 | <.0001 | 53.591 | 1.000 |
| Category for Duration * Subject | 52 | .592 | .011 | | | | |

Means Table for Duration

Effect: Category for Duration

| | Count | Mean | Std. Dev. | Std. Err. |
|---------|-------|------|-----------|-----------|
| H1.PERC | 27 | .500 | .165 | .032 |
| H2.PERC | 27 | .641 | .169 | .032 |
| H3.PERC | 27 | .708 | .108 | .021 |

5. A health educator suspects that the "days of discomfort" caused by common colds can be reduced by ingesting large doses of Vitamin C and visiting a sauna every day. Participants with new colds are randomly assigned to one of four different doses of Vitamin C (500, 1000, 1500, or 2000 milligrams) and to one of three different daily exposures to a sauna (0, .5, or 1 hour). The DV is the number of days of discomfort experienced by each of the participants. Complete the source table below and analyze and interpret the results of this study as completely as you can. Then tell me what your next step would be. [10 pts]

ANOVA Table for Days of Discomfort

| | DF | Sum of Squares | Mean Square | F-Value | P-Value | Lambda | Power |
|-------------------|----|----------------|-------------|---------|---------|--------|-------|
| Dose of C | | 4.983 | | | .0713 | 7.475 | .576 |
| Sauna | | 1.200 | | | .4133 | 1.800 | .190 |
| Dose of C * Sauna | | 3.067 | | | .5998 | 4.600 | .270 |
| Residual | | 32.000 | | | | | |

Means Table for Days of Discomfort

Effect: Dose of C * Sauna

| | Count | Mean | Std. Dev. | Std. Err. |
|----------------|-------|-------|-----------|-----------|
| 1000 mg, .5 Hr | 5 | 3.600 | 1.140 | .510 |
| 1000 mg, 0 Hr | 5 | 3.800 | .837 | .374 |
| 1000 mg, 1 Hr | 5 | 3.600 | 1.140 | .510 |
| 1500 mg, .5 Hr | 5 | 3.800 | .837 | .374 |
| 1500 mg, 0 Hr | 5 | 3.200 | .837 | .374 |
| 1500 mg, 1 Hr | 5 | 4.200 | .837 | .374 |
| 2000 mg, .5 Hr | 5 | 3.000 | .707 | .316 |
| 2000 mg, 0 Hr | 5 | 3.600 | .548 | .245 |
| 2000 mg, 1 Hr | 5 | 3.600 | .548 | .245 |
| 500 mg, .5 Hr | 5 | 4.200 | .837 | .374 |
| 500 mg, 0 Hr | 5 | 4.000 | .707 | .316 |
| 500 mg, 1 Hr | 5 | 4.400 | .548 | .245 |

6. Many research studies have found a negative relationship between average IQ and family size. Zajonc and Markus (1975) have developed a mathematical model for predicting the intellectual climate of a family based on the number of family members and their ages. For this exercise, see if you can develop a simple linear model for predicting intellectual climate (Y) from the number of children in a family (X), using the data below: [10 pts]

| | <u>Number of Children</u> | <u>Intellectual Climate</u> |
|----------|---------------------------|-----------------------------|
| | 3 | 8 |
| | 0 | 18 |
| | 4 | 8 |
| | 2 | 14 |
| | 1 | 12 |
| Sum | 10 | 60 |
| Mean | 2 | 12 |
| Variance | 2.5 | 18 |
| SS | 10 | 72 |