Assignment Three

Due Feb. 24

A researcher was interested in the effect of selected drugs on memory. She assigned paid participants to three different drug conditions: no drug (placebo), lithium and ecstasy. Shortly after taking one of the drugs or a placebo, the participants were shown a set of words. Half of the participants in each drug condition took a memory test one hour after being shown the words. The other half took the memory test 24 hours after being shown the words. The number of errors committed by each participant was recorded.

The researcher predicted that:

1. There would be significant main effects for both the drug and time factors.
2. There would not be a significant interaction between the drug and time factors.
3. Regarding how the drug factor means would differ, participants in the control (placebo) condition would make fewer errors on the recall test on average compared to the participants in the lithium and ecstasy conditions. There would be no difference between the lithium and ecstasy conditions in recall.
4. Regarding how the time factor means would differ, participants that took the recall test one hour after being shown the words would make fewer errors compared to the participants that took the test 24 hours after being shown the words.

The data to analyze for this assignment is contained in the *memstudy.csv* file*.* If you are using SAS On Demand, the *memstudy.csv* file is located in the directory */courses/d41266e5ba27fe300*. More detailed instructions on how to carry out ANOVA for this assignment using SAS will be given in class.

For this assignment, address all of the following:

1. Use SAS to conduct a two-way factorial ANOVA on the data contained in the *memstudy.csv* file. In addition, conduct tests of orthogonal contrasts to follow up all significant effects.
2. Examine the plot of the cell means output by SAS. Does the plot suggest that there is an interaction between the two factors? Explain.
3. Using the SAS output, evaluate the predictions made by the researcher for the two main effects and interaction. Which predictions were supported and which ones were not? Provide statistical evidence, i.e., the F-test result along with the p-value, in evaluating each prediction.
4. Using the results the drug factor contrasts, evaluate the predictions made by the researcher regarding how the drug factor means would differ. Provide statistical evidence that supports your evaluation.
5. Using the results the interaction contrasts, interpret the interaction between drug and time. Describe what is being compared by each interaction contrast. Provide statistical evidence that supports your interpretation.

Students shall turn in their SAS code, the pdf file containing the SAS results, and their written responses to the above items in class on the due date. The written responses must be in the form of grammatical and complete sentences. The results of statistical tests must be reported using APA format. For guidance on using APA format, students can check out <https://depts.washington.edu/psych/files/writing_center/stats.pdf> or other similar pages,

**Responses**

Based on the plot, I got the *p*<.0001, F(5,18)=10.61, for the interaction between time and drug on the effect on the number of errors on the participants. I would therefore reject the null hypothesis and say that I am 95% confident that there is an interaction between drug and time on the number of errors the participants made.

The researcher was incorrect about time, because time itself did not affect the number of errors of the participant, *F*(5,18)=3.45, *p*= .0795.The researcher was correct about drug, as drug did affect the number of errors on the participant *F*(5,18)= 11.65, *p*=.0006.The researcher was wrong in that there was a significant interaction between time and drug with a *p*=.0003 and a *F*(5,18) =10.61.

The researcher was correct that the number of errors would be the lowest in the control condition in both 1 hour (*M*=4.75, *SD*=1.71) and 24 hour (*M*=11.50, *SD*=1.291), with *F*(5,18)=21.51 and p =.0002 , showing that control did not have the same amount of errors as ecstasy or lithium condition. The researcher was also correct in that there was no difference between lithium and ecstasy batteries, as the *p*=.1972 with and F(5,18) = 1.79.

Based on time, the control conditions did not have the same amount of errors as ecstasy or lithium with *F*(5,18)=24.48, *p*=.0001. When comparing the conditions of ecstasy or lithium based on time, there was no difference in the amount of errors between them with *F*(5,18)=1.79, *p*=0.1972. Within the drugs and not based on time, there was no difference in the numbers of errors ecstasy had compared to lithium *F*(5,18)=1.79, *p*=0.1972.

**CODE**

proc import datafile="/folders/myfolders/sasuser.v94/memstudy.csv"

out= WORK.IMPORT

dbms=CSV

replace;

getnames=yes;

run;

proc glm;

class Time Drug;

model Num\_Errors = Time Drug Time\*Drug;

means Time\*Drug;

contrast 'control vs. ecstasy/lithium' Drug 2 -1 -1;

contrast 'lithium vs. ecstasy' Drug 0 1 -1;

contrast 'control vs. ecstasy/lithium by Time' Time \* Drug 2 -1 -1 -2 1 1;

contrast 'piano vs. ecstasy by Time' Time \* Drug 0 1 -1 0 -1 1;

run;