

## Homework 9

Due Wednesday, April 15

Ch 15 # 1, 3, 5, 7, 9, 13, 15, 18, 19, 36, 45, 46, 48

Ch 18 # 1, 2, 3, 5, 7\*, 9, 11\*, 29, 37, 38\*, 41\*, 43\*, 45\*

\* Probably you'll want to use SPSS.

### SPSS Project: Cardiac response to cocaine

Data in these problems is from an experiment by Mark M. Knuepfer, PhD, a SLU professor in the Department of Pharmacological and Physiological Science. Rats were treated with cocaine (5 mg/kg I.V.), and variables measuring cardiac response were recorded.

Get the file cocaine\_rats.sav, which contains data on 78 rats.

The variables in this file are:

RAT	An ID for each rat.
MR/VR	Classification as mixed responder (1) or vascular responder (2)
AP_CONTROL	Pre-treatment arterial pressure (blood pressure).
AP_PEAK	Peak post-treatment arterial pressure.
HR_CONTROL	Pre-treatment heart rate
HR_PEAK	Peak post-treatment heart rate
SV_PEAK	Peak heart stroke volume, given as % change from control.
CO_PEAK	Peak cardiac output, given as % change from control.
SVR_PEAK	Peak systemic vascular resistance, as % change from control.

#### Problem 1. **Normal or not?**

Check the seven quantitative variables for normality by making histograms (you need not print these out). How would you describe the CO\_PEAK and SVR\_PEAK histograms? Using the "Panel By" option in the histogram dialog, make histograms of CO\_PEAK and SVR\_PEAK split into MR/VR categories and print these out.

#### Problem 2. **Arterial pressure and heart rate**

- a. Create a new variable HR\_CHANGE as the difference (HR\_PEAK – HR\_CONTROL) of heart rate.
- b. Give a 95% confidence interval for the change in heart rate.
- c. State a hypothesis test (using  $H_0$  and  $H_a$ ) that the cocaine treatment had an effect on heart rate.
- d. Carry out this test with a one-sample t-test and report a P-value. Is the change significant?
- e. Repeat parts a-d using arterial pressure (AP)

Problem 3. **Explaining change in arterial pressure**

- a. Make a scatter plot with SVR\_PEAK as the explanatory variable and AP\_CHANGE (from problem 2) as the response variable. Set the markers by MR/VR so you can see the difference between the two groups. Add two regression lines to your graph (fit to the groups, not the total). Print this out.
- b. Discuss (using r-values) how well systemic vascular resistance explains the change in arterial pressure for the two groups.
- c. Repeat parts a and b using CO\_PEAK to explain AP\_CHANGE.

Problem 4. **Significant changes within the two groups**

- a. Select only the mixed responder rats ( $MR/VR = 1$ ). Use a one-sample t-test to determine which of the variables had a significant change before and after treatment (use HR\_CHANGE, AP\_CHANGE, and recall that SVR\_PEAK, CO\_PEAK, and SV\_PEAK are already given as a change). Give P-values and use 5% significance.  
Hint: You can do all 5 tests at once just by putting all five variables in the t-test dialog box.
- b. Repeat part a for the vascular responder rats ( $MR/VR = 2$ ).