

SPSS Lab 4: Correlations & Scatterplots

Section 1

In this lab we will be using everything we have learned in our text and applying that information to understanding correlations and scatterplots.

THERE WILL BE **TWO** SECTIONS FOR THIS LAB EACH CONTAINING TASKS TO COMPLETE. SEE ME WHEN YOU FINISH ONE SECTION TO RECEIVE THE NEXT SECTION.

Task 1: Understanding Variables

Motivation: when you want to know if there is a relationship between two or more variables

Correlation- a measure of the linear relationship between variables

Types of relations:

1. Positive- as one variable changes the other changes in the same direction
e.g. the more you study, the better you perform in your class
2. Negative- as one variable changes the other changes in the opposite direction
e.g. the more you study, the worse you perform in class
3. No relation- as one variable changes the other changes in the in no observable pattern
e.g. the more you study has no effect on how you perform in class

In most cases, we would say that the two variables Studying and Performance have a positive relationship.

Task 2: Load Your Data

Go to our course webpage (<http://laura.goadrich.com/stats/lab.html>). Under the lab section you will find ExamAnxiety.sav

1. Download ExamAnxiety.sav to your computer to use for the assignment.
2. Create a Word file Lab4.doc to put your solutions to the tasks below.
Put your name at the top of the file.

In this lab we are interested in the anxiety variable. The anxiety was measured before an exam, and the percentage mark of each student on the exam was used to assess the exam performance.

Note that the variable anxiety is measured from 0 (not anxious) to 100 (very anxious).

Task 3: A Simple Scatterplot

We are going to look at our data from SPSS using a Scatterplot. By definition a scatterplot is a graph that plots each person's score on one variable against their score on another.

1. Open SPSS.
2. Open ExamAnxiety.sav
3. Create an interactive graph by going to Graph -> Interactive -> Scatterplot...

In the dialog box, all of the variables in the data editor are displayed on the left-hand side and there are several empty spaces on the right-hand side.

4. Grab the **exam** variable and drag it to the y-axis.
5. Grab the **anxiety** variable and drag it to the x-axis.
6. Grab the **gender** variable and drag it to "Style" under "Legend Variables to Style"
7. Click OK

Copy your scatterplot to your Lab4.doc.

Questions to answer in your Lab4.doc:

- a. What are the independent and dependant variables that you plotted?
- b. Looking at the graph describe the behavior of all students?
- c. Do you notice any outliers? If so, what are they?
- d. Describe the general trend of the graph for the x- & y-axis.
- e. Do you notice any trends between the two sexes?

Please get the next section from me.

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Section 2

Task 4: A 3-D Scatterplot

3-D plots are not always appropriate unless the third dimension is telling us something useful. Let's create your next graph

1. Create an interactive graph by going to Graph -> Interactive -> Scatterplot...
2. On the button that says "2-D Coordinate," click the arrow and change it to 3-D Coordinate
3. Grab the **exam** variable and drag it to the y-axis.
4. Grab the **anxiety** variable and drag it to the x-axis.
5. Grab the **revise** variable and drag it to the z-axis.
6. Grab the **gender** variable and drag it to "Color" under "Legend Variables to Style."

Unfortunately the graph is a bit hard to read right now in your SPSS Viewer so let's change its rotation.

7. Double-click on the 3-D graph

Now you can manipulate the image through the 3-D text box that opened in your SPSS Viewer next to the graph.

8. Change the vertical rotation to 339
9. Change the horizontal rotation to 128

Copy your 3-D scatterplot to your Lab4.doc.

When you double-click on the graph, you will have a vertical left-hand bar with options.

10. Click on the hand with the arrow
11. Now click anywhere on the graph and rotate the graph around.

Questions to **answer** in your Lab4.doc as you manipulate the graph:

- f. Looking at the graph describe the behavior of all students with the new axis.
- g. Now describe the general trend of the graph for the x-, y-, and z-axis.
- h. Do you now notice any trends between the two sexes?

Task 5: Overlay Scatterplot

There are two different types of scatterplots that you can't do using interactive graphs: an overlay scatterplot and a matrix scatterplot. Both are very useful and worth understanding.

Overlay scatterplot- a scatterplot in which several pairs of variables are plotted on the same axes.

To keep the scatterplot informative, we need to keep one variable constant and plot it against several others. For our example, we are going to plot **anxiety** (X) against **exam performance** (Y), and then overlay **revise** (X) against **exam performance** (Y).

1. Create an overlay scatterplot by going to Graphs -> Scatter/Dot...
2. Click on **Overlay Scatter**
3. Click the button **Define**

On the left hand side, you will see the variables listed. Make sure you follow the next two steps IN ORDER because order matters.

4. Click once on the **exam** variable
5. Click once on the **revise** variable

Under the box with the variables is another box labeled **Current Selections**. You should see *Variable 1* defined to be **revise** and *Variable 2* defined to be **exam**.

6. Click on the arrow button next to the variable lists to move your two matched variables to the box for **Y-X pairs**

We are now going to repeat this for our second pairing.

7. Click once on the **exam** variable
8. Click once on the **anxiety** variable

Now under **Current Selections** you should see *Variable 1* defined to be **exam** and *Variable 2* defined to be **anxiety**.

9. Click on the arrow button next to the variable lists to move your two matched variables to the box for **Y-X pairs**

Unfortunately the order for Variable 1 and Variable 2 are incorrect (due to which variable comes first in the variable box). To fix it

10. Click once on **exam – anxiety**
11. Click on the button “Swap Pair”

Now you should have the pairs **revise – exam** and **anxiety – exam**.

12. Click OK.

Copy your graph to Lab4.doc

Answer the following questions in Lab4.doc

- i. What is your x- and y- axis for your graph?
- j. What do the blue circles and green circles stand for?
- k. What pattern in the data do you notice with your overlay scatterplot?

Task 6: Matrix Scatterplot

A matrix scatterplot allows you to see the relationship between all combinations of many different pairs of variables. We are going to plot the matrix scatterplot for the same data we used in Task 5.

1. Create a matrix scatterplot by going to
Graphs -> Scatter/Dot...
2. Click on **Matrix Scatter**
3. Click the button **Define**

Now you have a new dialog box with the variables listed on the left-hand side.

4. Click on **Exam Performance**
5. Click the **arrow** button to move exam performance under **Matrix Variables**.
6. Click on **Exam Anxiety**
7. Click the **arrow** button to move exam performance under **Matrix Variables**.
8. Click on **Time Spent Revising**
9. Click the **arrow** button to move exam performance under **Matrix Variables**.
10. Click Okay

Copy your graph to your Lab4.doc

Answer the following questions in Lab4.doc

- l. Why do you get a diagonal block of three cells with nothing inside?
- m. If you were to label the x-axis blocks from left to right A, B, C and the y-axis blocks from top to bottom 1, 2, 3, what would be the comparisons in the non-empty blocks? (i.e. B1: exam performance (Y) vs. anxiety (x))
- n. What similarity do you notice about the three scatterplots below the diagonal of the matrix and the tree above the diagonal matrix?
- o. What is the relationship between revision of time and anxiety? Do you notice an outlier in any of the blocks? If so which block(s) and what does it mean?
- p. How did participants who had low anxiety score on the exam?
- q. Would you want to plot more than three variables using a matrix plot (perhaps 10)? Why or why not?

