Lab 3: Correlations and Reliability Coefficients

Today’s Activities

• Review the correlation coefficient
• Descriptive statistics for Big Five at Time 1 and Time 2
  – Scatterplots
• Retest reliability
  – Calculation
  – Interpretation
• Inter-item correlation Matrices

Correlation Coefficient – Review
Correlation Review

- Correlation - degree to which the relation between the two variables fits a straight line
  - Form
  - Direction
  - Magnitude or strength

One Formula

- Numerical index that reflects the degree of linear association between two variables
- Covariance of X and Y Divided by the Product of the SDs of X and Y

\[ r = \frac{COV_{XY}}{SD_X \cdot SD_Y} \]

Descriptive Statistics and Scatterplots
Time 1 and Time 2 BFI

• Compare the descriptive statistics from the BFI scales at Time 1 with the descriptive statistics from the same scales at Time 2
  – Examine the means, medians, and standard deviations for Time 2
  – How close are these values to the Time 1 values?

Time 1 and Time 2 Extraversion

• Generate a scatterplot to visually examine how scores from Time 1 are associated with scores at Time 2
• Under Graph
  – Legacy Dialogs
  – Scatter/dot
  – Simple Scatter, Define
  – Select variables for X and Y axis (T1extra, T2extra)
  – Click OK

Time 1 and Time 2 BFI

• Repeat procedure to compare results for each of the Big Five scales
  – Agreeableness
  – Conscientiousness
  – Neuroticism
  – Openness
• Do the associations appear to be similar for each of the scales? If not, why might this be?
Test-Retest Reliability

Reliability

- We might want to quantify associations illustrated in scatterplots
  - Test-retest reliability
- Recall, **reliability** is a measure of how consistent a test score is.
  - Different types of consistency:
    - test-retest
    - internal consistency (alpha)
    - interobserver/interrater

Test-Retest Reliability

- **Test-retest reliability** measures the consistency of test scores when the same test is taken at two different times
  - *dependability of scores over time*
- To calculate, simply correlate scores at Time 1 with scores on the same scale at Time 2
- Under Analyze
  - Correlate, Bivariate
  - Select variables (T1extra, T2extra)
  - Click OK
Interpreting the Data

- Remember from lecture that reliability estimates range from 0 to 1.0. The closer a reliability estimate is to 1 the higher the consistency across time.
- Acceptable level of reliability depend on what the test is used for. Judgment is important!
  – Rules of thumb often found in the literature:
    • Reliability estimates above .8 indicate high to moderate reliability
    • .7 to .8 indicate moderate reliability
    • Under .7 indicate low reliability

Internal Consistency

- Quantifies how much consistency there is between the *items* in a scale
  – How well do the items “hang together”?
- If different items in a scale are consistently measuring the construct of interest, we should find associations between all of the items…
Internal Consistency
• The first step is to look at the Inter-item correlation Matrix
• For example, examine the associations between each of the items that comprise the Time 1 Extraversion scale of the BFI
• Under Analyze
  – Correlate, Bivariate
  – Select all items in the Time 1 E scale (1, 11, 16, 26, 36, 6R, 21R, 31R)
  – Click OK

Extraversion Inter-item Correlation Matrix
• Examine the matrix carefully. What is the range of correlations? Are there any particularly low values? Any particularly high values?
• After digesting this correlation matrix, we can calculate the standardized alpha to quantify the degree of internal consistency (reliability). Try it on your own using the formula from lecture.

Coefficient Alpha ($\alpha$)

$$\alpha = \frac{k \cdot \bar{r}_{ij}}{1 + (k - 1)\bar{r}_{ij}}$$

$k$ = the # of items and
$\bar{r}_{ij}$ = the average inter-item correlation
Internal Consistency

- Examine the inter-item correlation matrices for the other Time 1 Big Five scales.
  - Agreeableness (7, 17, 22, 32, 42, 2R, 12R, 27R, 37R)
  - Conscientiousness (3, 13, 28, 33, 8R, 18R, 23R, 43R)
  - Neuroticism (4, 14, 19, 29, 39, 9R, 24R, 34R)
  - Openness (5, 10, 15, 20, 25, 30, 40, 44, 35R, 41R)

What you need to turn in for HW #3

- Examine the scatterplots linking Time 1 and Time 2 scores for each of the five personality scales. Indicate which trait appears to have the highest level of consistency across time. Indicate which trait appears to have the lowest level of consistency across time. Explain how you came to these decisions. (1 pt)
- Create a table that includes test-retest reliability estimates for each of the Big Five scales. Do these estimates support your predictions based on an examination of the scatterplots? (2 pts)
- Examine the Inter-item Correlation Matrix for the Time 1 Agreeableness scale. Which two items show the highest association? What is the average inter-item correlation? (2 pts)
- Comparison of Media Article with Research Article. (5 Points)

Media Comparison (5 points)

- You have now read a piece of original research and a description of this research in the popular media. Now the task is to compare the two and critically evaluate the press coverage of this research in a 2 page essay.
- Do you think the press article did a good job of capturing the main findings of the original research? Why or why not? (2 points)
- What important details (if any) do you think were omitted from the media coverage of the article? For example, were any significant limitations of the original research left out of the media coverage? Why is this omission important? (2 points)
- Ultimately, do you think the press coverage was accurate? Why or why not? (1 point)