Lab 2: Descriptive Statistics

Today’s Activities
• Calculate Scales and Compute Descriptive Statistics with SPSS
• Examine Item Inter-Correlations
• Retrieve Actual Research Article Summarized in Media Report

Outline
• Big Five Inventory Analyses
  – Correctly Recode Reverse Scored Items
  – Calculate Means, SDs, and Medians for all five scales
  – Examine Histograms for all 5 scales
  – Create Z-Scores for all 5 scales
  – Interpret Z-Score profile for one individual
  – Identify potential outliers
  – Examine Item Correlations for E scale
What you need to turn in for HW #2

- A nice looking table with Means, SDs, and Medians for all five scales. These numbers must match the correct values to get credit. (2 pts)
- A table with the z score Big Five profile for the individual with the same ID number as this lab section. Provide an interpretation of this profile in words. (1 pt)
- A comment on whether or not there were any potential outliers for the Big Five and how you made that judgment. Identify those outliers. (1 pt)
- 1-2 Page Summary of Research Article (6 pts)

Big Five Inventory
(John, Donahue, & Kentle, 1991)

The Five Factors

I. Extraversion (Talkative, Energetic, Outgoing)
II. Agreeableness (Helpful, Trusting, Cooperative)
III. Conscientiousness (Reliable, Hardworking, Dependable)
IV. Neuroticism (Anxious, Tense, Moody)
V. Openness (Curious about intellectual and artistic matters, Values artistic experiences, Has an active imagination)

REMEMBER OCEAN
Recoding Reversed Items & Calculating Scale Scores

Example: Item #6 Measures Extraversion

- 6. I see myself as someone who is reserved.
- High scorers on this item are actually saying they are low on this indicator of Extraversion
- Therefore, we need to reverse score this item.
- Given that the responses go from 1 to 5 we can use an easy trick to reverse score this item.
- Under Transform
  - Compute: \( BFI6R = 6 - BFI6 \).

Reverse Scoring with a 1 to 5 Scale

<table>
<thead>
<tr>
<th>Original</th>
<th>Recoded</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>5</td>
</tr>
<tr>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
</tr>
<tr>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>5</td>
<td>1</td>
</tr>
</tbody>
</table>
Extraversion Scale (8 items)

- Reverse Items: 6, 21, 31
- Average Items: 1, 11, 16, 26, 36, 6R, 21R, 31R
- Under Transform

Agreeableness Scale (9 items)

- Reverse Items: 2, 12, 27, 37
- Under Transform

Conscientiousness Scale (9 items)

- Reverse: 8, 18, 23, 43
- Average Items: 3, 13, 28, 33, 38, 8R, 18R, 23R, 43R
- Under Transform
Neuroticism Scale (8 items)

• Reverse Items: 9, 24, 34
• Average Items: 4, 14, 19, 29, 39, 9R, 24R, 34R
• Under Transform

Openness (10 Items)

• Reverse Items: 35, 41
• Average Items: 5, 10, 15, 20, 25, 30, 40, 44, 35R, 41R,
• Under Transform

Descriptive Statistics and Histograms
Three Descriptive Statistics

- **Mean**: Arithmetic Average
- **Median**: The Middle Score or the 50th percentile. It is the value that divides the ordered scores into two equal groups (one high and one low).
- **Standard Deviation**: The square root of the Variance. SPSS calculates the Variance as the sum of the squared deviations from the sample mean divided by (n – 1).

Sample Data (Mean = 7.4, SD = 2.3)

<table>
<thead>
<tr>
<th>Person</th>
<th>HW Score</th>
<th>Mean</th>
<th>Squared Mean Deviation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sally</td>
<td>10</td>
<td>7.4</td>
<td>6.76</td>
</tr>
<tr>
<td>Roger</td>
<td>8</td>
<td>7.4</td>
<td>.36</td>
</tr>
<tr>
<td>Bob</td>
<td>5</td>
<td>7.4</td>
<td>5.76</td>
</tr>
<tr>
<td>Jane</td>
<td>9</td>
<td>7.4</td>
<td>2.56</td>
</tr>
<tr>
<td>Richard</td>
<td>5</td>
<td>7.4</td>
<td>5.76</td>
</tr>
</tbody>
</table>

Histograms
How to Get Required Information

• Under Analyze
  – Descriptive Statistics → Frequencies
• Select Variables
• Under Statistics
  – Request: Mean, Median, Std. deviation
• Under Charts
  – Request: Histograms
  – Check off “with normal curve”
• Finally, click OK

Output

• Means, SDs, and Medians
• Frequencies
  – Visually Examine Range of Scores
• Note Shape of the Distributions
• Record the Necessary Information for Homework
Z Scores

What is a Z Score?

- The z-score indicates how many standard deviations above or below the mean the individual score falls.
- This is considered a more readily interpretable score by measurement experts

Z Score Formula

\[ z = \frac{X - \text{Mean}}{SD} \]
Quickly ....

What is the Mean and SD of the Z Scores for any sample?

Consider the following battery of achievement tests for John Doe

<table>
<thead>
<tr>
<th>Test</th>
<th>Raw Score</th>
<th>z-Score</th>
</tr>
</thead>
<tbody>
<tr>
<td>English</td>
<td>67</td>
<td>-.50</td>
</tr>
<tr>
<td>Math</td>
<td>84</td>
<td>0</td>
</tr>
<tr>
<td>Biology</td>
<td>120</td>
<td>.75</td>
</tr>
<tr>
<td>History</td>
<td>97</td>
<td>-.25</td>
</tr>
</tbody>
</table>

How to Calculate Z-Scores in SPSS

- Method 1: Direct Calculation
  - Assume Mean of $E = 3.489$ and SD = .812
    - Under Transform
      - Compute: $ZEXTRA1 = (EXTRA - 3.489)/ .812$.
- Method 2: Use SPSS
  - Under Analyze \rightarrow Descriptive Statistics \rightarrow Descriptives
  - Select Variables and Click "Save Standardized Values as Variables"
  - New Variable: $ZEXTRA$ is the z scored variable $EXTRA$
Let's interpret some Big Five z-scores

<table>
<thead>
<tr>
<th>Trait</th>
<th>ZScore</th>
</tr>
</thead>
<tbody>
<tr>
<td>EXTRA</td>
<td>.37</td>
</tr>
<tr>
<td>AGREE</td>
<td>.29</td>
</tr>
<tr>
<td>CONS</td>
<td>.38</td>
</tr>
<tr>
<td>NEURO</td>
<td>-1.23</td>
</tr>
<tr>
<td>OPEN</td>
<td>-.45</td>
</tr>
</tbody>
</table>

* For the homework, you’ll need to create a table like this for the person whose ID number is the same as your PSY 395 section number. For example, students in section #1 will list and interpret the z-scores of person #1 in the data set.

Z Scores and Outliers

- Outliers are data points that are very different from the rest of the data.
- Two Possibilities
  - Data entry error
  - The data point is unusual
- For large datasets we might think that z-scores \(|z| \geq 3.0\) deserve to be examined as potential outliers.
- Why? 99% of the observations should fall between the -3.0 and 3.0 range.
- Other options include looking at Box Plots
  - Graphs → Boxplots
  - Select Simple and Summaries of Separate Variables

Item Inter-Correlations
How Strongly Related are the Extraversion Items?

- What do we expect?
- Use SPSS to create Correlation Matrix of the E Items
  - Under Analyze → Correlate → Bivariate Correlations
  - Select Variables: BFI1, BFI11, BFI16, BFI26, BFI36, BFI6R, BFI21R, BFI31R.
  - Under Options – Click Means and standard deviations
- What do you observe? What is the smallest correlation? What is the largest?

Research Article Summaries

Using the Internet to Find Articles

- MSU Library
  - Go to http://er.lib.msu.edu
  - Select Psychology for the drop down menu: Browse Other E-Resources by subject
  - Select PsycInfo including PsycArticles
- Google Scholar
  - http://scholar.google.com/
Summary of Research Article (6 points)

- Find the article described in the media article you found last week. Read the article.
- Note: If you can’t find that article then you must first find a media article that talks about a research study and then find the original article.
- What was the point of the study? (2 point)
  - What was the main hypothesis?
- What were the Major Variables and how were they measured or manipulated? (2 points)
- What were the Major Results? (2 points)
- Preview of Next Week: Compare Actual Article to News Article

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