PSY544 – Introduction to Factor Analysis

Final Exam, Fall 2018

Due midnight, January 31st, 2019

Read the 1999 paper by Tomas and Oliver on the factor structure of Rosenberg's Self-Esteem Scale (RSE; the paper can be found in IS in the Exam folder). I've (among other reasons) chosen this paper because it's quite a good (if a bit old) review of things we've learned throughout the semester – and I belive that after all we've learned, you should be fairly comfortable reading papers like this (in journals like *Structural Equation Modeling*, oh my!).

As it so happens, this website offers a lot of free self-report data to download and study. I've downloaded the data for the RSE, randomly taken two samples of N = 1000 each and calculated the correlation matrices for the ten RSE items. Find the matrices in IS in .csv files (cormat1.csv, cormat2.csv), where you can also find the accompanying codebook for the dataset (codebook.txt).

As you can see from the paper by Tomas and Oliver, different contesting ideas about what the questionnaire really measures can lead to different model formulations. Take a look at Figure 1 and the nine different path diagrams. Here, we will focus on models 1, 2, and 7 (I will further refer to them using this original numbering). As in Assignment 2, attach the R script file you have used for Part 2 to your submitted assignment and, in case you did not use R, attach the output as well.

Part 1

Use the correlation matrix in **cormat1.csv** for this part of the exam.

Obtain rotated Ordinary Least Squares solution for *m = 1* and *m = 2* factors using any rotation of your choice (except target rotation). Try two different oblique rotations for the two-factor model.

a) For the 1-factor model, explain the relationship between the value of the OLS discrepancy function and the elements in the residual correlation matrix in your own words.

b) If you would fit the 1-factor model using Maximum Likelihood instead, but you would still compute the RSS measure from the residual matrix, which method – OLS or ML – would produce a lower RSS value? Explain why.

c) Considering your results, which model from the original paper by Thomas and Oliver would you lean towards – Model 1, Model 2, or Model 7? Briefly summarize why.

Part 2

Use the correlation matrix in **cormat2.csv** for this part of the exam.

Fit the Models 1, 2, and 7 from the paper by Tomas and Oliver. Interpret on the meaning of the factors in each of the three models. Briefly write up the results (you can get inspiration from the paper itself, or from the guide I've referenced in Assignment 3), but nothing too long, please. Your write-up should result in a conclusion regarding which model would you choose and why.