Rasch Model Transcript:

I have been trying to understand Rasch modeling within the context of the Enterprise data that you sent which includes 24 questions on non-cognitive skills. Here are some updates and questions:

1. I looked at Seo Yeon's do files to understand how data was prepared. In general, I understood everything except I thought the questions which were reverse scaled should have been the other way round. For example, "Are you outgoing and sociable?" was scaled from 1-4 to reflect 1-highest and 4-lowest. I thought it should be the opposite. No? Was there any specific reason for doing so?

2. Cronbach's alpha: There are several ways in which we can carry out the Rasch modeling but if we were to group each of the Big Five questions into five categories (Openness, Extraversion,etc.) of 3 questions each, the five groups are not supported by Cronbach's alpha reliability coefficient that we obtain for the grouping. More below:

Personality Type Cronbach's Alpha Score

Extraversion 0.11

Conscientiousness 0.39

Openness 0.41

Emotional Stablity 0.36

Agreeableness 0.42

​3​. ​Instead if we are to group all 15 questions together without separating the 5 categories, we receive a Cronbach's alpha of 0.7. I still need to understand what this implies. Do you have any sense of how grouping 15 items may be problematic?

This example groups 10 test questions.

4. ​There were​, however,​ several articles that criticized the use of cronbach's alpha to justify unidimensionality. As you mention​ed before​, it is more a measure of reliability than unidimensionality (which is what we need for Rasch).

5. There is a Stata 14 command that performs Rasch Analysis called RASCHTEST. However, it only supports the questions that are binary (0-1) and not categorical (1-4) like in our case. Actually, I found out that what we need is something called a Rasch Rating Scale model. There is no single stata command that does it at once but there are ways to use and combine multiple commands to conduct the Rasch analysis. I'll be working to find out more about it.

6. There is a paper that uses Rasch modeling to validate the Big Five construct within the Japanese (!?) context. I'm trying to understand how they implement this in their paper since it seems fairly technical.

7. I will also try and see if there are in-built functions to conduct Rasch Rating Scale Analysis in R or Python.

Shin, I worked a little more on the Rasch model during this weekend. Here are some updates:

1. You are right, we need to view each of the Big Five categories as independent from the other, so we cannot bundle them together. The [paper](https://www.academia.edu/3185801/Using_Rasch_measurement_to_validate_the_Big_Five_Factor_Marker_questionnaire_for_a_Japanese_university_population) that I was reviewing to understand the application of Rasch Rating Scale Model using the Japanese context also separated out each of the five factors.

2. To implement the Rasch model, the paper I mentioned uses a program called [Winsteps](http://www.winsteps.com/winsteps.htm). This is unfortunately not available for free. However, it does have a mini-version which can take limited number of variables for free. I am planning on using that eventually to compare results.

3. Right now I am using R to implement the Rasch Rating Scale Model to the employee survey data. Currently, I have only managed to check the fit for one of the Big Five traits - "Agreeableness".

The variables that I am currently using are:

ag1 - Do you forgive other people easily?

ag2 - Are you very polite to other people?

ag3 - Are you generous with your time and money with other people?

I still need to understand fully what the results mean and what each of the coefficients imply. However, initial results look like following.

> thresholds(res.rsm)

Design Matrix Block 1:

    Location Threshold 1 Threshold 2 Threshold 3

ag1  1.35631     0.09376     1.41720     2.55795

ag2  1.35469     0.09215     1.41559     2.55634

ag3  1.07663    -0.18591     1.13752     2.27828

The Location parameter is the item "difficulty" and the threshold parameters are where the category curve intersect. I have implemented this using the eRm package in R and I am following the examples in different manuals ([here](https://cran.r-project.org/web/packages/eRm/vignettes/eRm.pdf) and [here](https://cran.r-project.org/web/packages/eRm/vignettes/eRm.pdf)) to understand.

The eRm function in R also gives ICC plots for different items used in a personality trait.



4. I plan to document similar work with the other four personality traits and to continue to understand what the different results mean intuitively. I will keep you updated on how the process unfolds and eventually if we can use some of the results to test the effect of non-cognitive skills on other outcomes.

Hope you are enjoying India!

Best,

Samik