BIRT-SF exercises

Introduction

The data for these exercises may be found in “BIRT Data.csv” with information on responses to items from the “Brain Injury Rehabilitation Trust” questionnaire from both patients and caretakers.

The paper by Pellicciari et al (2020) describe item analysis of five short form versions that fit Rasch models without DIF and local dependence.

The purpose of these exercises is to illustrate Rasch analysis including tests of person fit in DIGRAM of the BIRT-SF subscales.

Monday

Appendix 3 of the Supplemental material of Pellicciari (2020) defines the BIRT-SF subscales. All items define by four response categories (1=Never, 2=Sometimes, 3=Often, and 4=Always), but the analyses suggested that certain of these categories had to be collapsed to fit a polytomous Rasch model with ordered PCM-thresholds. In addition to this, the orientation of the items appears to have been flipped so that all items have the same orientation during the analysis. That had not been necessary, but it makes it easier to setup items for analysis by Rasch models.

The purpose of the Monday exercise is to create DIGRAM projects with the items for the subscales together with the exogenous variables included in the data set.

The following pages present the subscales and provide information on the categories.

Since DIGRAM limits the number of variables in projects, we suggest that you create one project per subscale. In addition to the items, the subscales should include information on six binary background variables for analyses of DIF

Education:	< 8 years or 8+ years
Gender:	Man or Woman
Age:	< 48 years or 48+ years
Time since lesion (TLS):	1-25 or 26+
Etiology:	TBI or No TBI
Respondent:	Patient or Caretaker

DIGRAM assumes that variables are included in a way that defined a meaningful recursive structure. [Items $\Leftarrow$ Respondent, $\Leftarrow$ TLS, Etiology $\Leftarrow$ Education $\Leftarrow$ Age, Gender] is one possibility, but other ways may be better.

BMQ – Motivation

Item	Categories	FLIPPED
BMQ02	1 2 3 4	
BMQ03	1 2 3 4	
BMQ04	1 2 3 4	
BMQ07	1 2 3 4	
BMQ08	1 2 3 4	
BMQ11	1 2 3 4	yes
BMQ12	1 2 3 4	
BMQ14	1 2 3 4	
BMQ15	1 2 3 4	
BMQ16	1 2 3 4	
BMQ19	1 2 3 4	yes
BMQ20	1 2 3 4	
BMQ22	1 2 3 4	yes
BMQ23	1 2 3 4	
BMQ25	1 2 3 4	
BMQ26	1 2 3 4	
BMQ27	1 2 3 4	
BMQ28	1 2 3 4	yes
BMQ31	1 2 3 4	

BREQ – Emotional regulation

Item	Categories	FLIPPED
BREQ01	1 2 3 4	
BREQ03	1 2 3 4	
BREQ07	1 **2-3** 4	
BREQ09	1 2 3 4	
BREQ10	1 2 3 4	
BREQ14	1 2 3 4	
BREQ15	1 2 3 4	
BREQ17	1 2 3 4	
BREQ19	1 2 3 4	
BREQ20	1 2 3 4	yes
BREQ21	1 2 3 4	
BREQ22	1 **2-3** 4	
BREQ23	1 **2-3** 4	
BREQ27	1 2 3 4	
BREQ30	1 2 3 4	
BREQ31	1 2 3 4	
BREQ32	1 2 3 4	

BSCQ – Social Cognition

Item	Categories	FLIPPED
BSCQ01	1 2 3 4	
BSCQ03	1 **2-3** 4	
BSCQ04	1 2 3 4	
BSCQ06	1 **2-3** 4	
BSCQ09	1 2 3 4	yes
BSCQ10	1 2 3 4	
BSCQ11	1 2 3 4	yes
BSCQ12	1 **2-3** 4	
BSCQ16	1 **2-3** 4	
BSCQ20	1 2 3 4	
BSCQ24	1 2 3 4	
BSCQ27	1 2 3 4	yes
BSCQ28	1 **2-3** 4	

BDQ – Disinhibition

Item	Categories	FLIPPED
BDQ01	1 2 3 4	
BDQ02	1 2 3 4	
BDQ03	1 2 3 4	
BDQ05	1 2 3 4	
BDQ06	1 2 3 4	
BDQ14	1 **2-3** 4	
BDQ16	1 2 3 4	
BDQ17	1 2 3 4	
BDQ18	1 **2-3** 4	
BDQ19	1 **2-3** 4	
BDQ22	1 **2-3** 4	
BDQ23	1 2 3 4	Yes
BDQ24	1 2 3 4	yes

BIQ – Impulsivity

Item	Categories	FLIPPED
BIQ02	1 **2-3** 4	yes
BIQ03	1 2 3 4	
BIQ07	1 2 3 4	
BIQ08	1 2 3 4	
BIQ09	1 2 3 4	yes
BIQ10	1 2 3 4	
BIQ11	1 **2-3** 4	
BIQ12	1 2 3 4	
BIQ14	1 2 3 4	
BIQ15	1 2 3 4	
BIQ16	1 **2-3** 4	
BIQ19	1 2 3 4	
BIQ24	1 2 3 4	
BIQ25	1 2 3 4	
BIQ28	1 2 3 4	
BIQ30	1 2 3 4	

Tuesday

For Tuesday, we have setup a DIGRAM project with the five Subscores and the background information on the respondents. If time permits, we will use this project to illustrate DIGRAM's procedures for test-equating, but the main purpose is to let you have a chance develop a graphical model describing the associations between the sub-scores and the exogenous variables describing respondents.

Wednesday

The purpose of the exercise today is to estimate and test the Rasch models for the five sub-scores including tests of unidimensionality.

Thursday

It will not be a surprise if evidence of local dependence turned up during the tests of fit to Rasch models, because DIGRAM has a number of powerful tests that are not available in other programs. If this is true and/or if evidence of DIF also turns up we will use this day to fit graphical log-linear Rasch model to the BIRT SF subscales.

Friday

Finally, on this day we will attempt to test for person fit in the subscales and discuss how to deal with it and how we can improve what DIGRAM has to offer.