University of Zurich UZH

Rasch Analysis : General Procedure & Outlook

Master Rasch Seminar 13 – 9.12.2020

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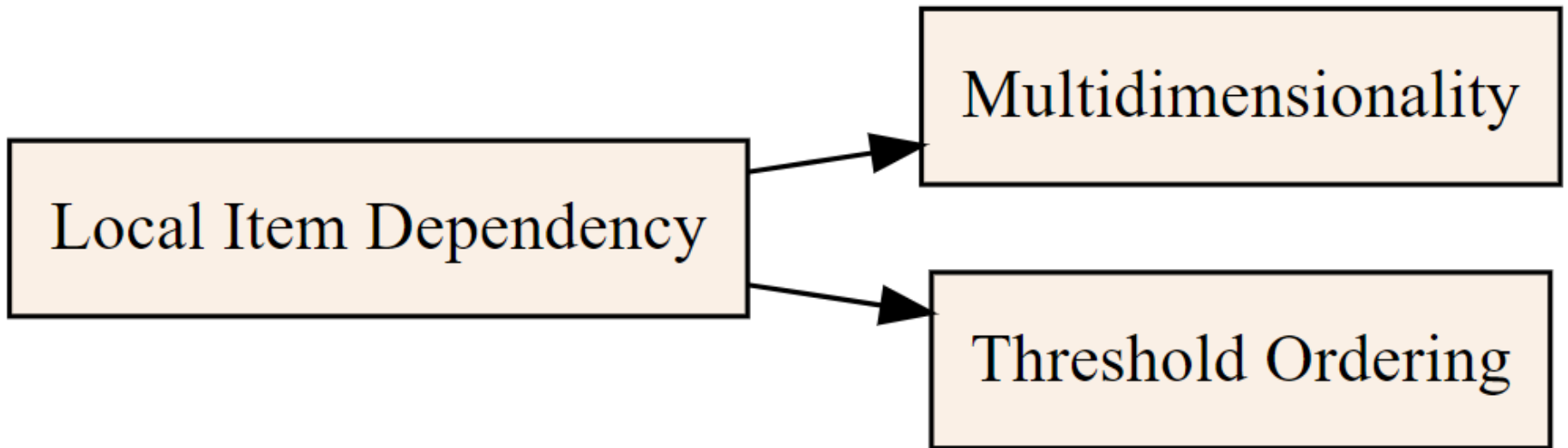
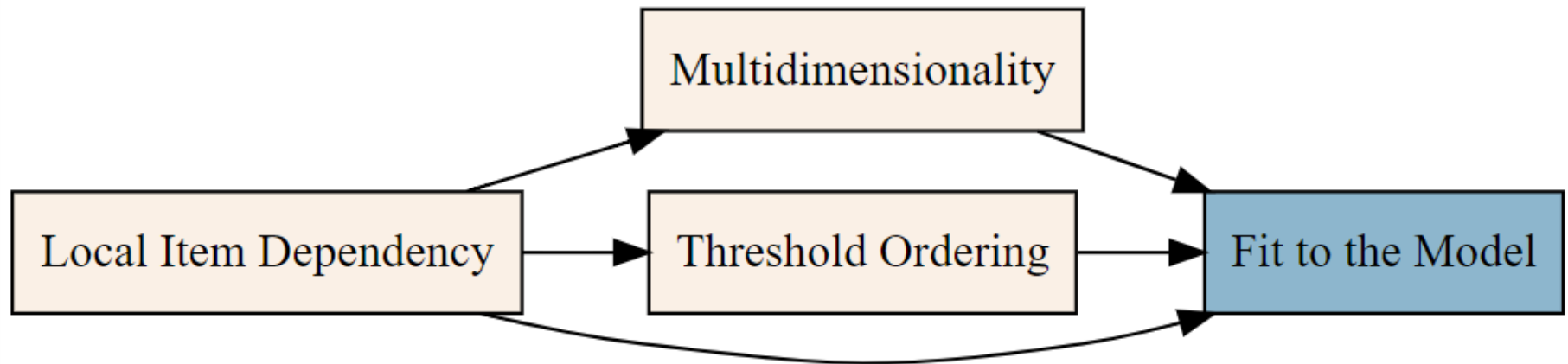# Rasch Analysis

Studies using Rasch analysis usually reports:
A) Fit statistics at start
B) Fit statistics when all breaches to the assumptions are fixed
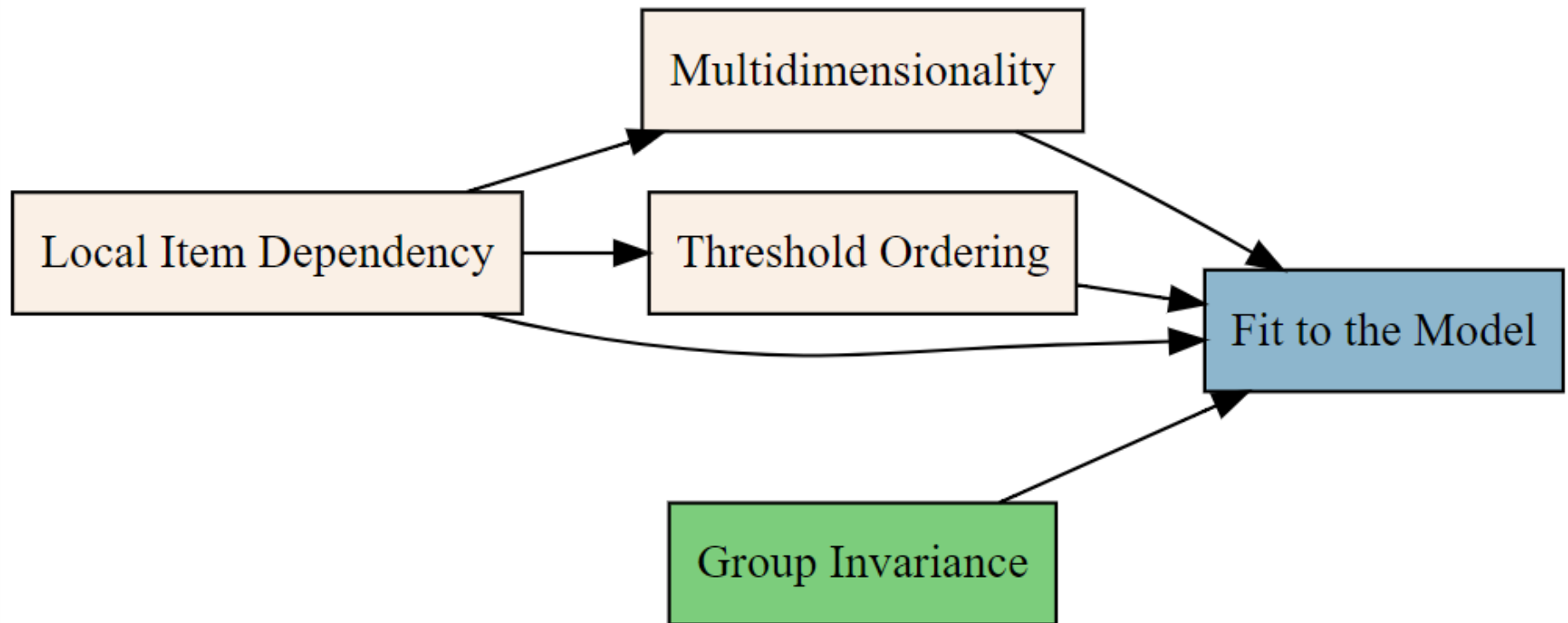
Often the strategy to go from A to B is not reported.

Rasch Analysis: Procedure

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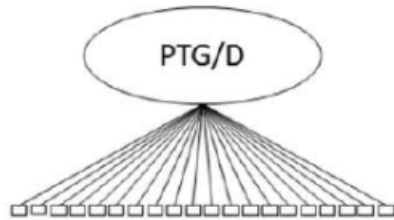
Rasch Analysis: Procedure

Rasch Analysis: Summarizing
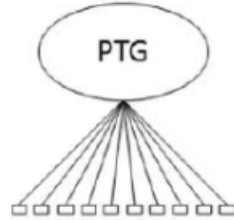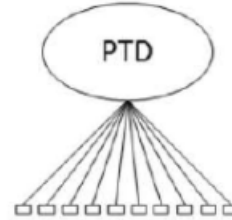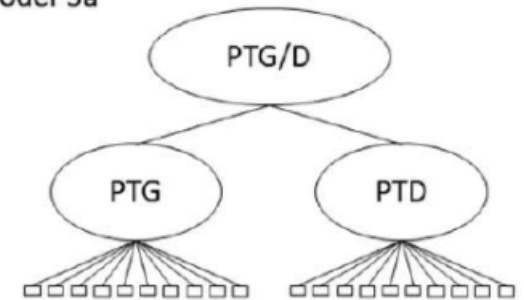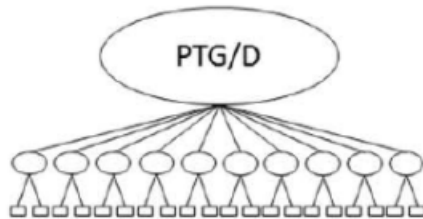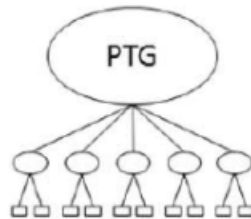
Rasch Analysis: Summarizing

Table 4 Start and final model targeting fit of entire WHODAS 2.0, each subscale, and the calibration of domains as items

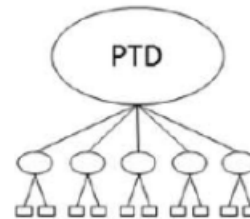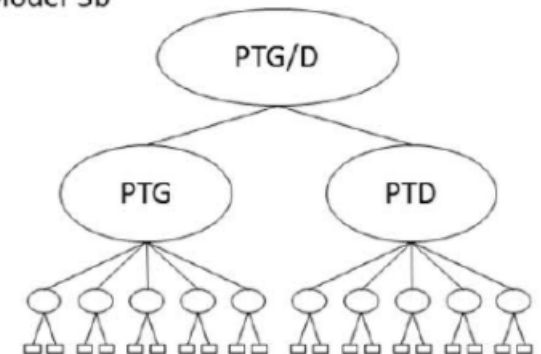| Dimension		Stage	Item difficulty		Person ability		Reliability		LID	Uniform DIF	Non-uniform DIF
			Mean	SD	Mean	SD	PSI	Cronbach alpha			
All	WHODAS 2.0	Start	0.05	0.71	−0.13	0.78	0.95	0.95	Yes	Yes	No
D1	Understanding and communicating	Start & Final	0.44	1.26	−0.58	1.34	0.91	0.91	No	No	No
D2	Getting around	Start	0.35	1.23	0.59	1.18	0.91	0.88	Yes	No	No
		Final	0.37	1.35	0.73	1.25	0.87	0.84	No	No	Yes
D3	Self-care	Start	0.54	1.90	−0.33	1.32	0.92	0.87	Yes	Yes	No
		Final	0.46	1.83	−0.36	1.11	0.89	0.67	No	Yes	No
D4	Getting along with people	Start	0.31	1.10	0.01	1.18	0.91	0.89	No	No	No
		Final	0.41	1.62	0.05	1.47	0.90	0.87	No	No	No
D5(1)	Household activities	Start & Final	2.15	5.00	2.39	4.04	0.98	0.99	No	No	No
D6	Participation in society	Start	0.25	0.73	0.26	1.01	0.90	0.88	Yes	Yes	No
		Final	0.26	0.93	0.27	1.05	0.89	0.83	No	Yes	No
Testlet		Start	0.02	0.96	−0.03	0.27	0.85	0.83	Yes	Yes	No
		Final	0.01	0.93	−0.02	0.22	0.79	0.75	No	Yes	No

PSI Person separation index, *LID* Local item dependency, *DIF* Differential item functioning

Rasch Analysis: Finalizing the SRG

During the course following issues where found for the SRG-scale.

1. **Item Fit (MS3):** Misfit in item *SRG15 I learned that there are more people who care about me than I thought* (Outfit = 1.622; Infit = 1.421)

2. **Targetting and Reliability (MS4)**: OK

3. **Threshold Ordering (MS5)**: OK

4. **Local Item Dependencies (MS6-MS7)**: no LID > 0.2

5. **Multidimensionality (MS8-MS10):** OK

6. **Differential Item Functioning (MS11-MS12):** *SRG8 I learned to be a more confident person* for gender.

Rasch Analysis: Finalizing the SRG

During the course following issues where found for the SRG-scale.

1. **Item Fit (MS3):** Misfit in item <mark style="background-color:red">SRG15</mark> *I learned that there are more people who care about me than I thought* (Outfit = 1.622; Infit = 1.421)

2. **Targetting and Reliability (MS4)**: OK

3. **Threshold Ordering (MS5)**: OK

4. **Local Item Dependencies (MS6-MS7)**: no LID > 0.2

5. **Multidimensionality (MS8-MS10):** OK

6. **Differential Item Functioning (MS11-MS12):** *SRG8 I learned to be a more confident person* for gender.

Rasch Analysis: Finalizing the SRG

Making a testlet with SRG15 and SRG13 (which had LID for the cut-off of Christense & al.) resulted in very bad fit.

Item fit and LID: Suggestion deleting SRG15.

DIF: (Assuming) goal is one metric for the entire SCI sample, and that the systematic differences for gender in item SRG8 is not understood as a "favoritism" for one of the subgroup. Let's not split the item and keep just one difficulty estimate for SRG8.

Rasch Analysis: Finalizing the SRG

SRG-metric
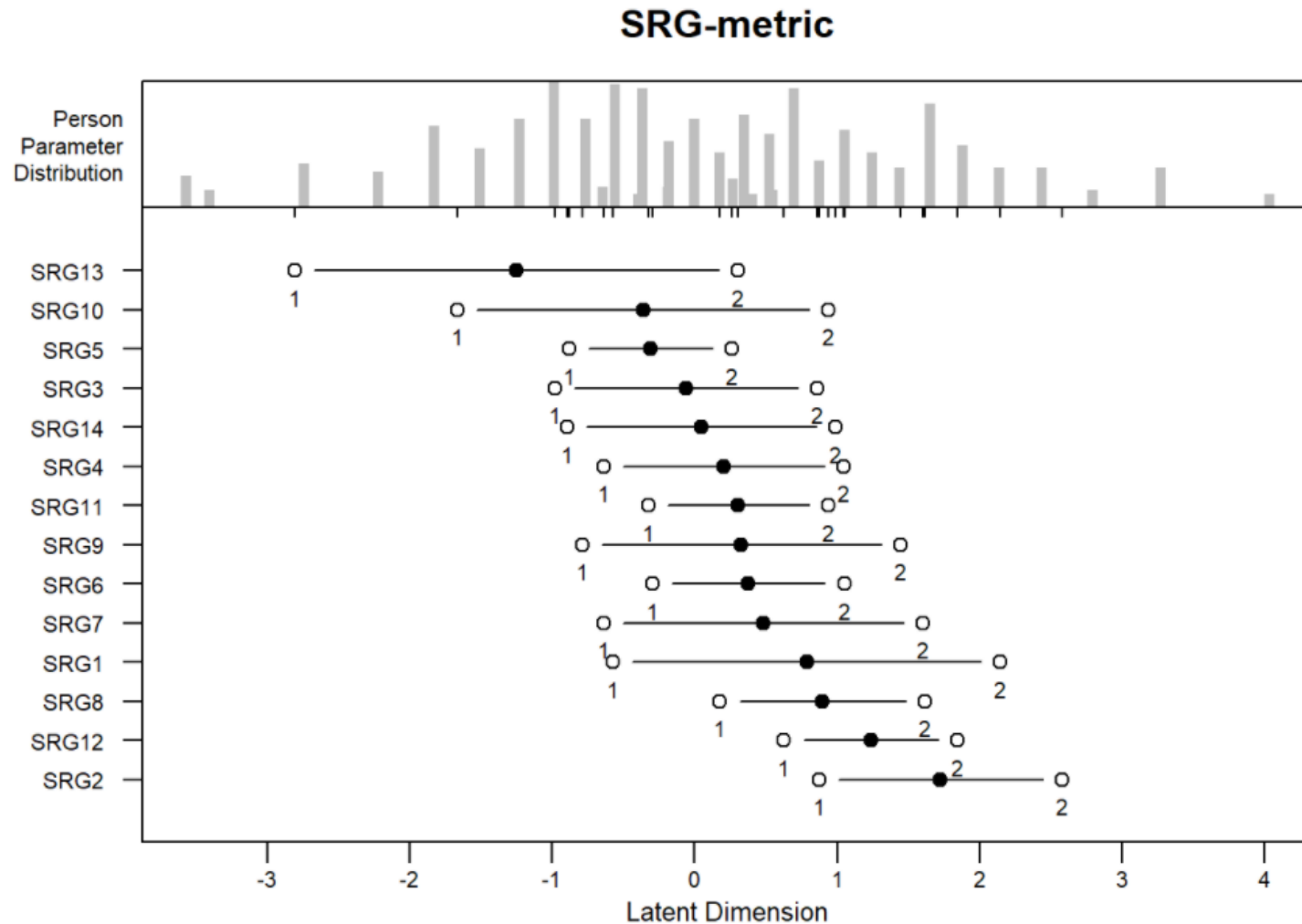
Rasch Analysis: Finalizing the SRG

```
Itemfit Statistics:
       Chisq   df  p-value  Outfit MSQ  Infit MSQ  Outfit t  Infit t  Discrim
SRG1   403.527 430 0.816    0.936       0.975      -0.930    -0.382   0.554
SRG2   481.746 430 0.043    1.118       1.115       0.996     1.537   0.481
SRG3   479.234 429 0.047    1.114       1.079       1.593     1.302   0.543
SRG4   383.938 430 0.946    0.891       0.926      -1.538    -1.243   0.618
SRG5   420.058 432 0.651    0.970       1.017      -0.340     0.306   0.586
SRG6   401.453 432 0.851    0.927       0.917      -0.915    -1.369   0.628
SRG7   344.610 429 0.999    0.801       0.829      -3.075    -2.973   0.664
SRG8   396.960 432 0.886    0.917       0.938      -0.925    -0.957   0.606
SRG9   397.358 432 0.883    0.918       0.923      -1.236    -1.297   0.602
SRG10  378.226 430 0.966    0.878       0.878      -1.933    -2.040   0.598
SRG11  384.962 432 0.949    0.889       0.897      -1.418    -1.726   0.647
SRG12  401.636 427 0.806    0.938       0.961      -0.538    -0.543   0.583
SRG13  514.941 432 0.004    1.189       1.110       2.499     1.708   0.384
SRG14  362.936 432 0.993    0.838       0.855      -2.446    -2.522   0.655
```

Rasch Analysis: Finalizing the SRG

During the course following issues where found for the SRG-scale.

1. **Item Fit:** no outfit or infit > 1.2

2. **Targetting and Reliability**: OK (PSI = 0.8966, test targeting = 0.097)

3. **Threshold Ordering**: OK

4. **Local Item Dependencies** : no dependencies > 0.2

5. **Multidimensionality:** OK

6. **Differential Item Functioning:** *n.a.*

Rasch Analysis: Transformation Table

- When the Rasch model fits, a transformation table is created.

- The transformation table links

  rows scores -> ability estimates -> 0-100 scale

- The range of the user-friendly score is typically from 0 to 100.

Rasch Analysis: Computer Adaptive Testing

Boston University: School of Public Health