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# APPLICATION OF THE MANY FACET RASCH MODEL TO VALIDATE A SURVEY FOR THE SELECTION OF CHIEF RESIDENTS

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## BACKGROUND

Chief Resident (CR) selection process requires a collective effort from the Program Director, relevant faculty members, and input from the resident group. However, the literature does not show any established guidelines, methods, or psychometric instruments for selecting CRs in academic programs.

## PURPOSE

To validate a newly designed instrument for CR selection based on the characteristics and leadership qualities from the residents' perspectives.

This study addressed the following questions:

- How well the candidates can be differentiated based on the newly designed instrument for the CR selection?
- Do some residents rate the candidates more severely or leniently than others?
- Is the newly designed instrument reliable for the selection of CRs? Does each item of the instrument perform well?

## METHODS

We designed and implemented a 16-item survey regarding CR candidates' characteristics and leadership skills in our Residency Program. A many facet Rasch model (MFRM) was applied to simultaneously estimate candidate's performance, item psychometric characteristics, and the raters' (residents) severity in the rating process (Linacre, 1994; Linacre, 2002).

## RESULTS

Four pediatric residents were nominated by the Clinical Competency Committee for the selection of CR and 40 residents in the program were involved in the rating process (Table 1). Candidate 1 has the highest performance among all four candidates with a measure of 3.61 in logit scale and fair average rating of 5.62 after correction for raters' severity and leniency, which ranges from less than -3.62 for extremely leniency to 3.41 for very severe (Table 2). Item difficulty ranges from -0.44 (very easy) for **item 3** (respectful) to 0.51 (very difficult) for **item 8** (acceptance of criticism /ability to accept his/her own mistakes), and **item 7** (listening ability) and **item 10** (diversity awareness / open-minded) exhibit poor item fit, indicating these two items do not contribute a lot to assessing candidates' performance. Residents' familiarity with candidates is not the main factor affecting CR selection.

Interaction analysis of candidates and items (Figure 1) showed that Candidate 2 received particular low ratings on **item 4** (confident), item 9 (common sense and judgment), and item 11 (efficient / resourceful). This provides diagnostic information for this candidate to improve in the future endeavors in the residency program.

**Table 1:** Overall ratings across 16 questions

	Very Poor (1)	Poor (2)	Below Average (3)	Average (4)	Very Good (5)	Excellent (6)
Candidate 1	0	0	0	28	174	320
Candidate 2	0	2	16	89	167	273
Candidate 3	0	0	1	40	171	196
Candidate 4	0	0	5	57	188	184

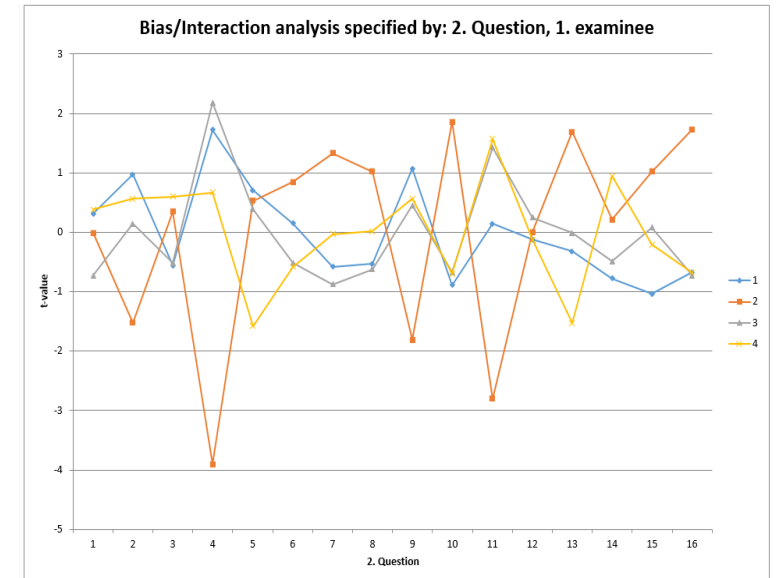
**Table 2:** Candidates' performance from many facet Rasch model

Table 7.1.1 examinee Measurement Report (arranged by MN).

Obsvd Score	Obsvd Count	Obsvd Average	Fair-M Average	Measure	Model S.E.	Infit MnSq	Zstd	Outfit MnSq	Zstd	Estim. Discrm	N examinee
2191	418	5.2	5.31	2.73	.08	.87	-2.0	.82	-2.2	1.18	4 4
2689	515	5.2	5.31	2.74	.07	1.24	3.6	1.24	2.7	.76	2 2
2194	408	5.4	5.47	3.15	.09	.83	-2.5	.94	-.5	1.17	3 3
2614	474	5.5	5.62	3.61	.09	.99	-.1	1.00	.0	.97	1 1
2422.0	453.8	5.3	5.43	3.06	.08	.98	-.3	1.00	.0		Mean (Count: 4)
231.0	43.4	.1	.13	.36	.01	.16	2.4	.15	1.8		S.D. (Populn)
266.8	50.1	.1	.14	.42	.01	.19	2.8	.18	2.1		S.D. (Sample)
Model, Populn: RMSE .08 Adj (True) S.D. .35 Separation 4.27 Reliability .95											
Model, Sample: RMSE .08 Adj (True) S.D. .41 Separation 4.96 Reliability .96											
Model, Fixed (all same) chi-square: 76.2 d.f.: 3 significance (probability): .00											
Model, Random (normal) chi-square: 2.9 d.f.: 2 significance (probability): .23											

## RESULTS

**Figure 1:** Interaction analysis of 4 candidates and 16 questions



## CONCLUSION

Our newly developed survey can differentiate CR candidates' performance as well as identify why a specific candidate is selected or not through MFRM. This innovative application of MFRM provides us insights into the survey development and personal performance improvement and our diagnostic tool can be applied to other residency programs.

## REFERENCES

- Linacre, J. M. (1994). *Many-facet Rasch measurement (2nd Ed.)*. Chicago: MESA.  
 Linacre, J. M. (2002). Construction of measures from many-facet data. *Journal of Applied Measurement*, 3, 486-512.