

Supplementary Materials

Table S1. Example Contingency Table of An Item for Generating the MIXED Type of Missingness

Ability Fractiles	Total Score Range	Contingency Table 1			Contingency Table 2		
		# Missing	# Incorrect	Relative Frequency of Missing	# Missing	# Correct	Relative Frequency of Missing
1	0-4	10	10	0.50	10	2	0.83
2	5-9	178	221	0.45	178	2	0.99
3	10-14	461	712	0.39	461	67	0.87
4	15-19	384	711	0.35	384	280	0.58
5	20-24	137	346	0.28	137	380	0.26
6	25-29	31	121	0.20	31	247	0.11
7	30-34	2	15	0.12	2	48	0.04

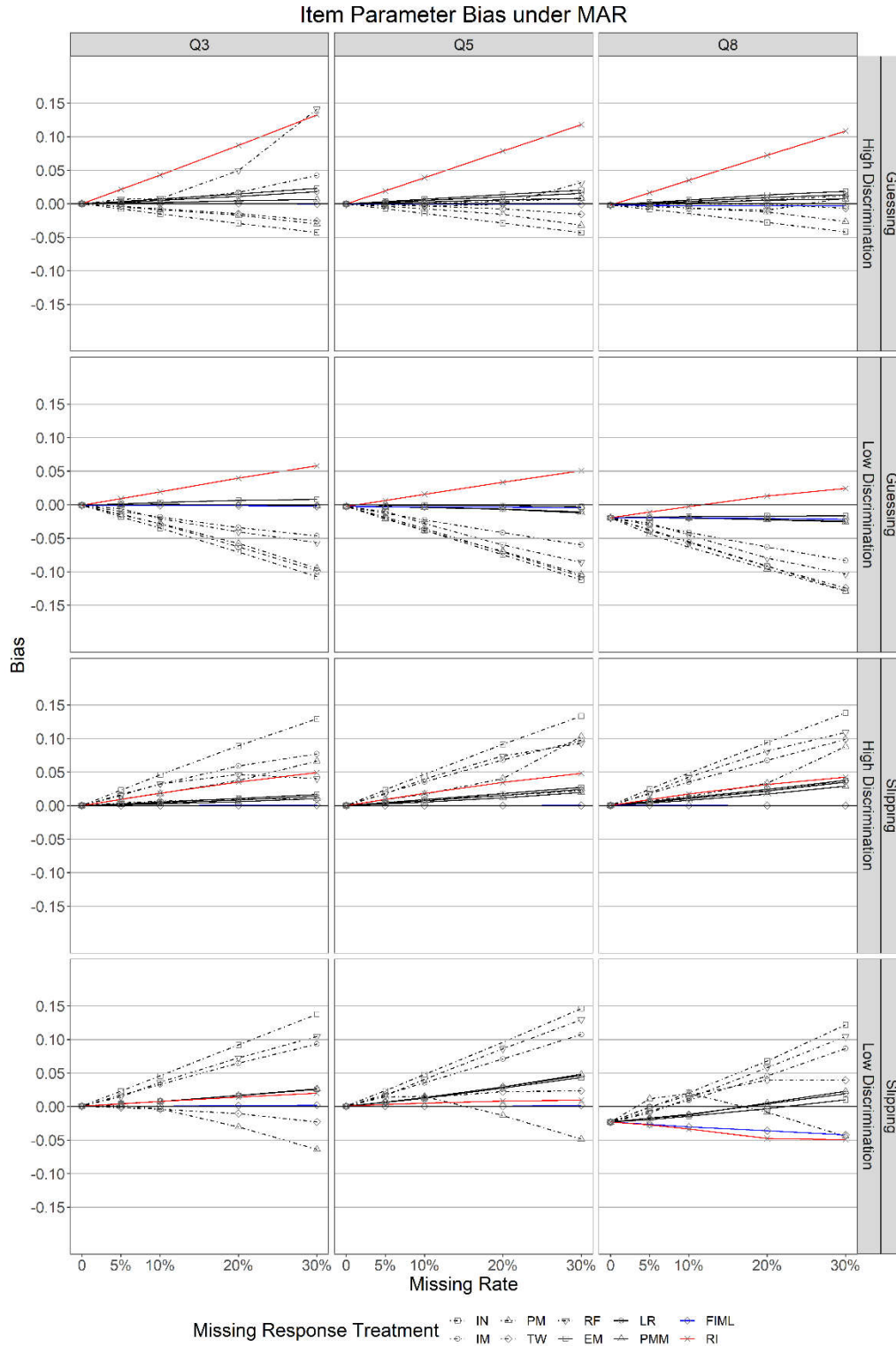


Figure S1. Bias of item parameter estimations under the MAR mechanism. Columns of Q3, Q5, and Q8 present results for Q-matrices with 3, 5, and 8 attributes, while rows refer to results across high and low discriminations for both guessing and slipping parameters.

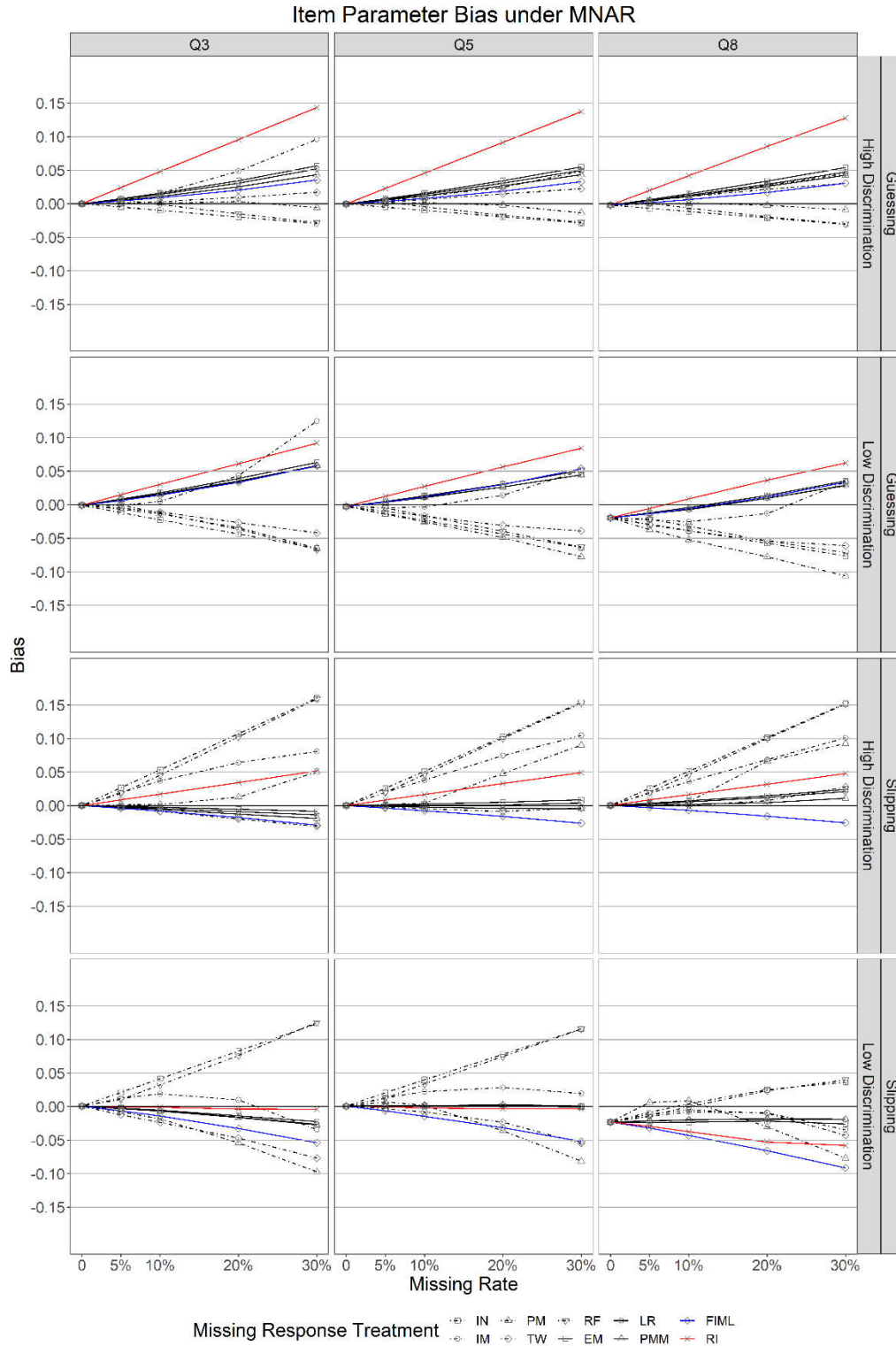


Figure S2. Bias of item parameter estimations under the MNAR mechanism. Columns of Q3, Q5, and Q8 present results for Q-matrices with 3, 5, and 8 attributes, while rows refer to results across high and low discriminations for both guessing and slipping parameters.

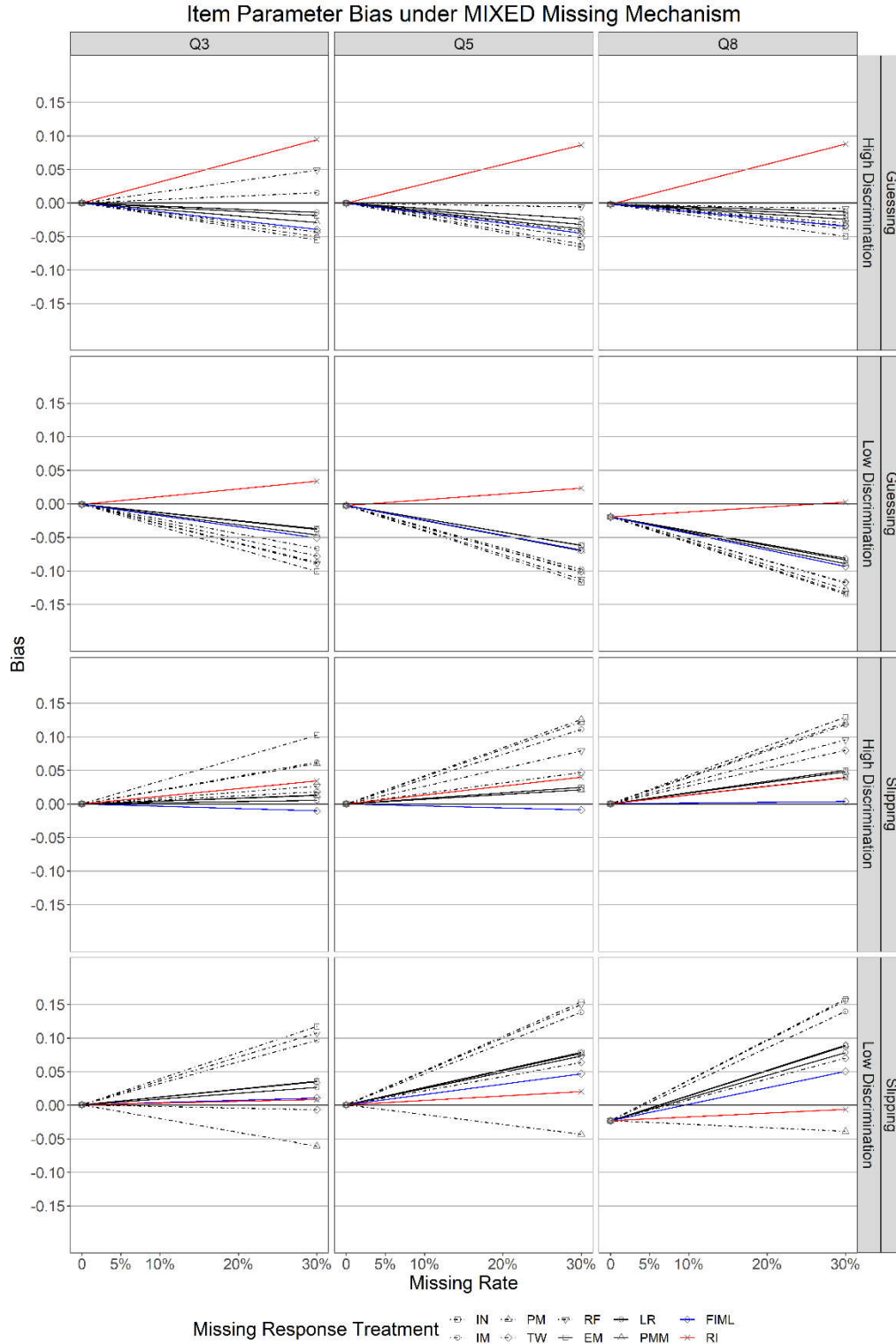


Figure S3. Bias of item parameter estimations under the MIXED missing mechanism. Columns of Q3, Q5, and Q8 present results for Q-matrices with 3, 5, and 8 attributes, while rows refer to results across high and low discriminations for both guessing and slipping parameters.