

Online Supplement

A1. Bias and RMSE for the latent trait estimates, and test reliability of the various item selection methods using the fixed-length termination rule

Length	$\rho_{\theta_1, \theta_2}$	Method	Bias		MSE		Reliability	
			θ_1	θ_2	θ_1	θ_2	θ_1	θ_2
20	0	RS	-0.074	-0.065	0.462	0.434	0.61	0.62
		FI	-0.033	-0.026	0.195	0.181	0.84	0.85
		KL	-0.059	-0.050	0.258	0.232	0.81	0.81
		MI	-0.027	-0.028	0.190	0.182	0.84	0.85
	0.3	RS	-0.068	-0.059	0.392	0.383	0.65	0.66
		FI	-0.024	-0.029	0.170	0.173	0.85	0.85
		KL	-0.042	-0.044	0.211	0.205	0.83	0.83
		MI	-0.021	-0.026	0.167	0.167	0.85	0.85
	0.6	RS	-0.055	-0.053	0.307	0.299	0.71	0.72
		FI	-0.018	-0.018	0.151	0.152	0.87	0.87
		KL	-0.028	-0.031	0.171	0.164	0.85	0.86
		MI	-0.017	-0.017	0.150	0.151	0.86	0.87
	0.9	RS	-0.029	-0.033	0.202	0.206	0.81	0.81
		FI	-0.014	-0.017	0.101	0.101	0.90	0.91
		KL	-0.018	-0.020	0.105	0.102	0.90	0.91
		MI	-0.014	-0.017	0.101	0.101	0.90	0.91
60	0	RS	-0.056	-0.045	0.244	0.214	0.80	0.81
		FI	-0.026	-0.018	0.097	0.087	0.92	0.92
		KL	-0.036	-0.026	0.123	0.112	0.91	0.91
		MI	-0.025	-0.018	0.096	0.087	0.92	0.92
	0.3	RS	-0.046	-0.037	0.211	0.198	0.82	0.83
		FI	-0.017	-0.018	0.089	0.082	0.92	0.93
		KL	-0.024	-0.026	0.104	0.100	0.91	0.92
		MI	-0.015	-0.018	0.086	0.081	0.92	0.93
	0.6	RS	-0.034	-0.037	0.167	0.162	0.85	0.85
		FI	-0.012	-0.014	0.078	0.074	0.93	0.93
		KL	-0.017	-0.020	0.086	0.081	0.92	0.93
		MI	-0.012	-0.014	0.078	0.074	0.93	0.93
	0.9	RS	-0.017	-0.018	0.100	0.100	0.90	0.91
		FI	-0.010	-0.010	0.054	0.053	0.95	0.95
		KL	-0.011	-0.011	0.055	0.053	0.95	0.95
		MI	-0.010	-0.010	0.054	0.052	0.95	0.95

Note. $\rho_{\theta_1, \theta_2}$ = correlation between θ_1 and θ_2 ; RS = random selection; FI = Fisher information matrix; KL = Kullback-Leibler information; MI = mutual information; MSE = mean squared error.

A2: Bias and MSE for latent trait estimates, test reliability, TLS, and %ETA of various item selection methods using the fixed-precision termination rule

SE	$\rho_{\theta_1, \theta_2}$	Method	Bias		MSE		Reliability		TLS				%ETA
			θ_1	θ_2	θ_1	θ_2	θ_1	θ_2	Mean	SD	Min	Max	
0.55	0	RS	-0.065	-0.062	0.288	0.276	0.77	0.78	52.1	35.2	15	387	0.3
		FI	-0.039	-0.033	0.317	0.303	0.75	0.75	10.8	9.2	7	304	0.2
		KL	-0.056	-0.060	0.275	0.270	0.81	0.81	25.8	28.9	7	380	0.3
		MI	-0.027	-0.038	0.300	0.309	0.75	0.76	11.6	10.8	6	265	0.3
	0.3	RS	-0.063	-0.051	0.290	0.274	0.76	0.77	41.0	22.4	9	322	0.0
		FI	-0.036	-0.033	0.304	0.307	0.74	0.74	9.0	4.6	6	259	0.0
		KL	-0.048	-0.054	0.262	0.271	0.79	0.79	18.0	16.4	7	284	0.0
		MI	-0.032	-0.030	0.292	0.304	0.74	0.74	9.4	4.7	6	182	0.0
	0.6	RS	-0.047	-0.041	0.286	0.280	0.74	0.75	24.7	9.8	8	169	0.0
		FI	-0.018	-0.023	0.302	0.313	0.74	0.73	6.8	1.2	5	18	0.0
		KL	-0.037	-0.048	0.274	0.275	0.77	0.77	9.8	4.7	5	67	0.0
		MI	-0.024	-0.034	0.301	0.309	0.73	0.73	6.9	1.3	5	19	0.0
0.9	RS	-0.026	-0.032	0.291	0.293	0.72	0.73	11.2	4.3	3	77	0.0	
	FI	-0.030	-0.034	0.296	0.306	0.74	0.73	4.0	0.7	3	6	0.0	
	KL	-0.046	-0.052	0.295	0.300	0.74	0.73	4.3	0.8	3	7	0.0	
	MI	-0.028	-0.036	0.296	0.297	0.74	0.74	4.2	0.6	4	7	0.0	
0.32	0	RS	-0.029	-0.027	0.093	0.090	0.92	0.93	183.2	72.9	71	399	12.1
		FI	-0.023	-0.019	0.097	0.092	0.92	0.92	63.1	47.9	29	388	12.0
		KL	-0.028	-0.022	0.090	0.085	0.93	0.93	95.7	71.8	30	399	12.2
		MI	-0.025	0.040	0.132	0.411	0.91	0.91	64.4	51.1	29	398	11.7
	0.3	RS	-0.023	-0.026	0.091	0.086	0.92	0.92	174.7	70.3	72	399	7.5
		FI	-0.019	-0.019	0.095	0.093	0.92	0.92	58.4	43.3	28	382	7.4
		KL	-0.025	-0.020	0.087	0.085	0.92	0.93	87.3	65.8	29	399	7.6
		MI	-0.020	0.043	0.114	0.358	0.91	0.91	58.2	43.4	28	388	7.8
	0.6	RS	-0.024	-0.018	0.095	0.086	0.91	0.92	144.8	59.4	65	399	1.9
		FI	-0.016	-0.013	0.099	0.094	0.91	0.91	45.4	30.7	26	389	1.8
		KL	-0.020	-0.018	0.091	0.087	0.92	0.92	64.8	48.4	26	399	1.9
		MI	-0.015	0.022	0.103	0.232	0.91	0.91	44.1	26.5	26	377	3.0
	0.9	RS	-0.016	-0.021	0.100	0.097	0.90	0.91	61.2	27.2	31	398	0.1
		FI	-0.015	-0.017	0.103	0.102	0.90	0.90	20.2	8.9	15	288	0.1
		KL	-0.015	-0.018	0.100	0.098	0.91	0.91	22.4	9.9	16	299	0.1
		MI	-0.012	-0.012	0.105	0.111	0.90	0.90	20.1	7.9	15	314	0.3

Note. SE = standard error of θ_1 and θ_2 ; $\rho_{\theta_1, \theta_2}$ = correlation between θ_1 and θ_2 ; RS = random selection; FI = Fisher information matrix; KL = Kullback-Leibler information; MI = mutual information; MSE = mean squared error; TLS = test length that examinees required to stop the tests when their latent traits' precision met the requirement; %ETA = percentage of examinees taking all items in the item bank.