

Appendix A3

Table A3.1. General linear model results for RMSE under the unconditional model.

Source	DF	SS	Mean Square	F Value	Pr > F	
Model	107	374.68	3.50	8573.07	<.0001	
Error	53786	21.97	0.00			
Corrected Total	53893	396.65				
R-Square	Coeff Var	Root MSE	Mean			
0.944614	3.84876	0.02	0.53			
Proportion of Variation Accounted for						
Eta-Squared	0.94					
ω^2	0.94					
95% CI	(0.94,0.95)					

Source	DF	Type III SS	Mean Square	F Value	Pr > F	Semipartial Eta-Squared
SS	2	0.05	0.03	66.23	<.0001	0.00
NI	2	324.96	162.48	397799.00	<.0001	0.82
IM	2	41.83	20.92	51211.10	<.0001	0.11
DF	1	1.74	1.74	4264.15	<.0001	0.00
PD	1	2.73	2.73	6695.68	<.0001	0.01
SS*NI	4	0.00	0.00	0.42	0.80	0.00
SS*IM	4	0.00	0.00	0.75	0.56	0.00
SS*DF	2	0.00	0.00	0.64	0.53	0.00
SS*PD	2	0.00	0.00	1.48	0.23	0.00
NI*IM	4	0.47	0.12	286.17	<.0001	0.00
NI*DF	2	0.49	0.25	602.99	<.0001	0.00
NI*PD	2	0.92	0.46	1126.22	<.0001	0.00
IM*DF	2	0.10	0.05	117.13	<.0001	0.00
IM*PD	2	0.06	0.03	69.85	<.0001	0.00
DF*PD	1	1.14	1.14	2799.16	<.0001	0.00
SS*NI*IM	8	0.01	0.00	1.63	0.11	0.00
SS*NI*DF	4	0.00	0.00	0.90	0.46	0.00
SS*NI*PD	4	0.00	0.00	0.19	0.94	0.00
SS*IM*DF	4	0.00	0.00	1.73	0.14	0.00
SS*IM*PD	4	0.00	0.00	2.32	0.05	0.00
SS*DF*PD	2	0.00	0.00	1.11	0.33	0.00
NI*IM*DF	4	0.01	0.00	7.96	<.0001	0.00
NI*IM*PD	4	0.03	0.01	15.88	<.0001	0.00
NI*DF*PD	2	0.20	0.10	248.13	<.0001	0.00
IM*DF*PD	2	0.00	0.00	4.92	0.01	0.00
SS*NI*IM*DF	8	0.00	0.00	0.52	0.84	0.00
SS*NI*IM*PD	8	0.00	0.00	1.04	0.41	0.00
SS*NI*DF*PD	4	0.00	0.00	1.51	0.20	0.00
SS*IM*DF*PD	4	0.00	0.00	0.70	0.59	0.00
NI*IM*DF*PD	4	0.00	0.00	1.18	0.32	0.00
SS*NI*IM*DF*PD	8	0.00	0.00	0.53	0.83	0.00

Note: Under "Source," the following abbreviations are used: SS =sample size; NI = number of items; IM = impact condition; DF = DIF magnitude; PD = percent of items with DIF.

Table A3.2. General linear model results for RMSE under the impact-only model.

Source	DF	SS	Mean Square	F Value	Pr > F	
Model	107	407.27	3.81	5419.33	<.0001	
Error	53786	37.78	0.00			
Corrected Total	53893	445.05				
R-Square	Coeff Var	Root MSE	Mean			
0.915118	5.197	0.03	0.51			
Proportion of Variation Accounted for						
Eta-Squared	0.92					
ω^2	0.91					
95% CI	(0.91,0.92)					

Source	DF	Type III SS	Mean Square	F Value	Pr > F	Semipartial Eta-Squared
SS	2	2.25	1.12	1600.43	<.0001	0.01
NI	2	284.29	142.14	202384.00	<.0001	0.64
IM	2	4.19	2.10	2984.11	<.0001	0.01
DF	1	40.75	40.75	58023.30	<.0001	0.09
PD	1	54.05	54.05	76951.70	<.0001	0.12
SS*NI	4	0.40	0.10	141.69	<.0001	0.00
SS*IM	4	0.09	0.02	30.48	<.0001	0.00
SS*DF	2	0.08	0.04	56.16	<.0001	0.00
SS*PD	2	0.06	0.03	44.97	<.0001	0.00
NI*IM	4	0.56	0.14	199.17	<.0001	0.00
NI*DF	2	0.04	0.02	27.84	<.0001	0.00
NI*PD	2	0.67	0.34	478.49	<.0001	0.00
IM*DF	2	0.16	0.08	113.59	<.0001	0.00
IM*PD	2	0.06	0.03	45.26	<.0001	0.00
DF*PD	1	20.43	20.43	29090.10	<.0001	0.05
SS*NI*IM	8	0.07	0.01	12.30	<.0001	0.00
SS*NI*DF	4	0.02	0.01	8.32	<.0001	0.00
SS*NI*PD	4	0.02	0.00	5.99	<.0001	0.00
SS*IM*DF	4	0.01	0.00	2.76	0.03	0.00
SS*IM*PD	4	0.00	0.00	1.51	0.20	0.00
SS*DF*PD	2	0.03	0.02	22.99	<.0001	0.00
NI*IM*DF	4	0.02	0.00	5.75	0.00	0.00
NI*IM*PD	4	0.00	0.00	1.03	0.39	0.00
NI*DF*PD	2	0.48	0.24	343.87	<.0001	0.00
IM*DF*PD	2	0.02	0.01	10.97	<.0001	0.00
SS*NI*IM*DF	8	0.00	0.00	0.66	0.73	0.00
SS*NI*IM*PD	8	0.01	0.00	0.94	0.48	0.00
SS*NI*DF*PD	4	0.01	0.00	3.49	0.01	0.00
SS*IM*DF*PD	4	0.00	0.00	0.61	0.66	0.00
NI*IM*DF*PD	4	0.00	0.00	0.70	0.59	0.00
SS*NI*IM*DF*PD	8	0.00	0.00	0.58	0.80	0.00

Note: Under "Source," the following abbreviations are used: SS =sample size; NI = number of items; IM = impact condition; DF = DIF magnitude; PD = percent of items with DIF.

Table A3.3. General linear model results for RMSE under the impact-and-DIF model.

Source	DF	SS	Mean Square	F Value	Pr > F	
Model	107	313.33	2.93	6926.33	<.0001	
Error	53786	22.74	0.00			
Corrected Total	53893	336.07				
R-Square	Coeff Var	Root MSE	Mean			
0.932336	4.39733	0.02	0.47			
Proportion of Variation Accounted for						
Eta-Squared	0.93					
ω^2	0.93					
95% CI	(0.93,0.93)					

Source	DF	Type III SS	Mean Square	F Value	Pr > F	Semipartial Eta-Squared
SS	2	2.87	1.44	3398.87	<.0001	0.01
NI	2	303.33	151.67	358736.00	<.0001	0.90
IM	2	5.59	2.79	6605.16	<.0001	0.02
DF	1	0.02	0.02	49.83	<.0001	0.00
PD	1	0.66	0.66	1552.12	<.0001	0.00
SS*NI	4	0.37	0.09	218.47	<.0001	0.00
SS*IM	4	0.13	0.03	76.42	<.0001	0.00
SS*DF	2	0.00	0.00	0.79	0.45	0.00
SS*PD	2	0.15	0.08	179.73	<.0001	0.00
NI*IM	4	0.39	0.10	231.88	<.0001	0.00
NI*DF	2	0.00	0.00	0.66	0.51	0.00
NI*PD	2	0.12	0.06	141.49	<.0001	0.00
IM*DF	2	0.05	0.03	64.33	<.0001	0.00
IM*PD	2	0.00	0.00	2.18	0.11	0.00
DF*PD	1	0.00	0.00	9.22	0.00	0.00
SS*NI*IM	8	0.06	0.01	18.04	<.0001	0.00
SS*NI*DF	4	0.00	0.00	1.10	0.35	0.00
SS*NI*PD	4	0.05	0.01	27.58	<.0001	0.00
SS*IM*DF	4	0.00	0.00	1.18	0.32	0.00
SS*IM*PD	4	0.02	0.00	10.40	<.0001	0.00
SS*DF*PD	2	0.00	0.00	2.03	0.13	0.00
NI*IM*DF	4	0.00	0.00	2.34	0.05	0.00
NI*IM*PD	4	0.01	0.00	7.12	<.0001	0.00
NI*DF*PD	2	0.00	0.00	1.59	0.20	0.00
IM*DF*PD	2	0.00	0.00	2.35	0.10	0.00
SS*NI*IM*DF	8	0.00	0.00	0.52	0.84	0.00
SS*NI*IM*PD	8	0.01	0.00	2.94	0.00	0.00
SS*NI*DF*PD	4	0.00	0.00	2.32	0.05	0.00
SS*IM*DF*PD	4	0.00	0.00	0.62	0.65	0.00
NI*IM*DF*PD	4	0.00	0.00	0.72	0.58	0.00
SS*NI*IM*DF*PD	8	0.00	0.00	0.88	0.53	0.00

Note: Under "Source," the following abbreviations are used: SS =sample size; NI = number of items; IM = impact condition; DF = DIF magnitude; PD = percent of items with DIF.

Table A3.4. Average RMSE across all scoring models and design factors at N = 500.

6 Items	Unconditional Score		Impact-Only Score		Impact-and-DIF Score	
	Mean	SD	Mean	SD	Mean	SD
<i>Small Mean/Large Variance</i>						
33% Small DIF	0.651	0.035	0.589	0.051	0.585	0.043
66% Small DIF	0.653	0.036	0.614	0.054	0.606	0.059
33% Large DIF	0.653	0.036	0.602	0.061	0.580	0.046
66% Large DIF	0.667	0.038	0.733	0.113	0.606	0.066
<i>Medium Mean/Medium Variance</i>						
33% Small DIF	0.612	0.025	0.574	0.027	0.572	0.026
66% Small DIF	0.612	0.025	0.602	0.031	0.591	0.033
33% Large DIF	0.611	0.024	0.582	0.029	0.568	0.025
66% Large DIF	0.620	0.026	0.707	0.063	0.589	0.038
<i>Large Mean/Small Variance</i>						
33% Small DIF	0.601	0.020	0.547	0.022	0.545	0.022
66% Small DIF	0.598	0.022	0.575	0.028	0.557	0.026
33% Large DIF	0.600	0.021	0.561	0.026	0.546	0.022
66% Large DIF	0.604	0.021	0.694	0.062	0.562	0.028
12 Items	Unconditional Score		Impact-Only Score		Impact-and-DIF Score	
	Mean	SD	Mean	SD	Mean	SD
<i>Small Mean/Large Variance</i>						
33% Small DIF	0.554	0.034	0.486	0.028	0.482	0.029
66% Small DIF	0.560	0.034	0.509	0.033	0.493	0.037
33% Large DIF	0.562	0.037	0.504	0.036	0.481	0.031
66% Large DIF	0.583	0.036	0.599	0.048	0.490	0.037
<i>Medium Mean/Medium Variance</i>						
33% Small DIF	0.504	0.024	0.476	0.022	0.472	0.022
66% Small DIF	0.511	0.023	0.500	0.022	0.483	0.023
33% Large DIF	0.505	0.022	0.493	0.024	0.472	0.021
66% Large DIF	0.529	0.025	0.587	0.036	0.481	0.024
<i>Large Mean/Small Variance</i>						
33% Small DIF	0.489	0.019	0.461	0.019	0.456	0.018
66% Small DIF	0.492	0.018	0.484	0.022	0.462	0.019
33% Large DIF	0.488	0.018	0.484	0.023	0.456	0.018
66% Large DIF	0.506	0.019	0.579	0.037	0.465	0.019
24 Items	Unconditional Score		Impact-Only Score		Impact-and-DIF Score	
	Mean	SD	Mean	SD	Mean	SD
<i>Small Mean/Large Variance</i>						
33% Small DIF	0.457	0.033	0.396	0.025	0.391	0.026
66% Small DIF	0.466	0.032	0.419	0.024	0.396	0.027
33% Large DIF	0.465	0.033	0.413	0.026	0.387	0.024
66% Large DIF	0.504	0.030	0.510	0.036	0.393	0.025
<i>Medium Mean/Medium Variance</i>						
33% Small DIF	0.410	0.022	0.390	0.018	0.384	0.019
66% Small DIF	0.418	0.021	0.414	0.020	0.387	0.020
33% Large DIF	0.413	0.022	0.408	0.021	0.381	0.019
66% Large DIF	0.454	0.022	0.503	0.030	0.387	0.020
<i>Large Mean/Small Variance</i>						
33% Small DIF	0.391	0.017	0.377	0.017	0.369	0.016
66% Small DIF	0.401	0.017	0.405	0.020	0.377	0.017
33% Large DIF	0.390	0.017	0.401	0.021	0.368	0.016
66% Large DIF	0.429	0.016	0.504	0.029	0.377	0.017

Table A3.5. Average RMSE across all scoring models and design factors at N = 1000.

6 Items	Unconditional Score		Impact-Only Score		Impact-and-DIF Score	
	Mean	SD	Mean	SD	Mean	SD
<i>Small Mean/Large Variance</i>						
33% Small DIF	0.649	0.0258	0.569	0.0233	0.565	0.0227
66% Small DIF	0.654	0.0255	0.596	0.0259	0.577	0.0279
33% Large DIF	0.651	0.0246	0.580	0.0269	0.563	0.0218
66% Large DIF	0.664	0.0259	0.696	0.0494	0.569	0.0263
<i>Medium Mean/Medium Variance</i>						
33% Small DIF	0.610	0.0178	0.563	0.0172	0.560	0.0171
66% Small DIF	0.608	0.0175	0.588	0.0192	0.569	0.0181
33% Large DIF	0.608	0.0194	0.569	0.0193	0.557	0.0177
66% Large DIF	0.618	0.0182	0.685	0.0360	0.567	0.0182
<i>Large Mean/Small Variance</i>						
33% Small DIF	0.600	0.0147	0.537	0.0135	0.534	0.0136
66% Small DIF	0.596	0.0151	0.566	0.0183	0.544	0.0158
33% Large DIF	0.599	0.0151	0.550	0.0163	0.536	0.0144
66% Large DIF	0.602	0.0158	0.673	0.0386	0.546	0.0162
12 Items						
	Unconditional Score		Impact-Only Score		Impact-and-DIF Score	
	Mean	SD	Mean	SD	Mean	SD
<i>Small Mean/Large Variance</i>						
33% Small DIF	0.552	0.0237	0.479	0.0186	0.473	0.0189
66% Small DIF	0.557	0.0241	0.498	0.0200	0.475	0.0200
33% Large DIF	0.558	0.0257	0.493	0.0214	0.469	0.0203
66% Large DIF	0.581	0.0240	0.581	0.0282	0.471	0.0196
<i>Medium Mean/Medium Variance</i>						
33% Small DIF	0.504	0.0171	0.471	0.0153	0.466	0.0152
66% Small DIF	0.509	0.0164	0.494	0.0152	0.470	0.0152
33% Large DIF	0.505	0.0163	0.489	0.0156	0.465	0.0141
66% Large DIF	0.528	0.0173	0.576	0.0240	0.469	0.0152
<i>Large Mean/Small Variance</i>						
33% Small DIF	0.486	0.0129	0.453	0.0128	0.446	0.0120
66% Small DIF	0.491	0.0128	0.477	0.0135	0.453	0.0126
33% Large DIF	0.485	0.0130	0.476	0.0151	0.448	0.0116
66% Large DIF	0.505	0.0131	0.573	0.0247	0.456	0.0128
24 Items						
	Unconditional Score		Impact-Only Score		Impact-and-DIF Score	
	Mean	SD	Mean	SD	Mean	SD
<i>Small Mean/Large Variance</i>						
33% Small DIF	0.454	0.0226	0.391	0.0169	0.384	0.0171
66% Small DIF	0.467	0.0235	0.415	0.0177	0.387	0.0186
33% Large DIF	0.465	0.0235	0.409	0.0173	0.381	0.0177
66% Large DIF	0.505	0.0234	0.501	0.0229	0.384	0.0185
<i>Medium Mean/Medium Variance</i>						
33% Small DIF	0.406	0.0160	0.384	0.0133	0.376	0.0135
66% Small DIF	0.416	0.0144	0.408	0.0129	0.378	0.0127
33% Large DIF	0.412	0.0158	0.403	0.0145	0.374	0.0131
66% Large DIF	0.451	0.0157	0.494	0.0178	0.379	0.0135
<i>Large Mean/Small Variance</i>						
33% Small DIF	0.389	0.0113	0.372	0.0108	0.364	0.0107
66% Small DIF	0.398	0.0111	0.400	0.0120	0.368	0.0103
33% Large DIF	0.391	0.0109	0.396	0.0136	0.364	0.0107
66% Large DIF	0.427	0.0117	0.494	0.0205	0.369	0.0113

Table A3.6. Average RMSE across all scoring models and design factors at N = 2000.

6 Items	Unconditional Score		Impact-Only Score		Impact-and-DIF Score	
	Mean	SD	Mean	SD	Mean	SD
<i>Small Mean/Large Variance</i>						
33% Small DIF	0.650	0.0180	0.564	0.0158	0.560	0.0150
66% Small DIF	0.654	0.0189	0.587	0.0172	0.564	0.0161
33% Large DIF	0.649	0.0186	0.571	0.0173	0.555	0.0153
66% Large DIF	0.666	0.0193	0.684	0.0294	0.559	0.0149
<i>Medium Mean/Medium Variance</i>						
33% Small DIF	0.609	0.0137	0.559	0.0123	0.556	0.0124
66% Small DIF	0.607	0.0123	0.582	0.0130	0.559	0.0113
33% Large DIF	0.608	0.0125	0.565	0.0125	0.553	0.0115
66% Large DIF	0.619	0.0135	0.675	0.0242	0.559	0.0119
<i>Large Mean/Small Variance</i>						
33% Small DIF	0.599	0.0101	0.534	0.0093	0.531	0.0091
66% Small DIF	0.594	0.0098	0.559	0.0118	0.535	0.0100
33% Large DIF	0.598	0.0110	0.544	0.0106	0.530	0.0098
66% Large DIF	0.602	0.0109	0.664	0.0247	0.538	0.0101
12 Items	Unconditional Score		Impact-Only Score		Impact-and-DIF Score	
	Mean	SD	Mean	SD	Mean	SD
<i>Small Mean/Large Variance</i>						
33% Small DIF	0.552	0.0175	0.475	0.0137	0.468	0.0136
66% Small DIF	0.557	0.0173	0.494	0.0130	0.468	0.0129
33% Large DIF	0.555	0.0179	0.488	0.0143	0.463	0.0134
66% Large DIF	0.581	0.0183	0.576	0.0193	0.465	0.0137
<i>Medium Mean/Medium Variance</i>						
33% Small DIF	0.501	0.0116	0.468	0.0098	0.461	0.0101
66% Small DIF	0.508	0.0114	0.490	0.0107	0.465	0.0103
33% Large DIF	0.504	0.0114	0.485	0.0107	0.460	0.0102
66% Large DIF	0.526	0.0112	0.571	0.0165	0.463	0.0095
<i>Large Mean/Small Variance</i>						
33% Small DIF	0.486	0.0089	0.451	0.0087	0.444	0.0082
66% Small DIF	0.490	0.0094	0.475	0.0102	0.448	0.0087
33% Large DIF	0.484	0.0089	0.473	0.0100	0.444	0.0083
66% Large DIF	0.505	0.0102	0.566	0.0166	0.450	0.0091
24 Items	Unconditional Score		Impact-Only Score		Impact-and-DIF Score	
	Mean	SD	Mean	SD	Mean	SD
<i>Small Mean/Large Variance</i>						
33% Small DIF	0.454	0.0157	0.389	0.0114	0.381	0.0117
66% Small DIF	0.467	0.0170	0.413	0.0126	0.383	0.0131
33% Large DIF	0.462	0.0170	0.406	0.0129	0.378	0.0125
66% Large DIF	0.503	0.0160	0.495	0.0148	0.379	0.0120
<i>Medium Mean/Medium Variance</i>						
33% Small DIF	0.406	0.0105	0.382	0.0091	0.374	0.0091
66% Small DIF	0.416	0.0108	0.405	0.0093	0.375	0.0095
33% Large DIF	0.411	0.0104	0.400	0.0092	0.372	0.0090
66% Large DIF	0.450	0.0104	0.491	0.0129	0.375	0.0089
<i>Large Mean/Small Variance</i>						
33% Small DIF	0.387	0.0080	0.370	0.0074	0.361	0.0073
66% Small DIF	0.397	0.0077	0.396	0.0084	0.365	0.0075
33% Large DIF	0.389	0.0080	0.392	0.0092	0.361	0.0075
66% Large DIF	0.426	0.0088	0.490	0.0145	0.366	0.0081