Threshold Conditions

threshold condition	no. cats	category thresholds as Z-scores						proportion of cases in each category: underlying normal							underlying nonnormal						
Symmetric	2	0.00						50	50						62	38					
	3	-0.83	0.83					20	59	20					15	69	16				
	4	-1.25	0.00	1.25				11	39	39	11				1	61	28	10			
	5	-1.50	-0.50	0.50	1.50			7	24	38	24	7			0	36	42	14	8		
	6	-1.60	-0.83	0.00	0.83	1.60		5	15	30	30	15	6		0	15	47	22	9	7	
	7	-1.79	-1.07	-0.36	0.36	1.07	1.79	4	11	22	28	22	11	4	0	4	40	29	14	6	6
Mod. Asym	2	0.36						64	36						74	26					
	3	-0.50	0.76					31	47	22					36	47	17				
	4	-0.31	0.79	1.66				38	41	17	5				47	36	10	7			
	5	-0.70	0.39	1.16	2.05			24	41	22	10	2			23	52	14	7	4		
	6	-1.05	0.08	0.81	1.44	2.33		15	38	26	14	7	1		5	60	19	8	5	3	
	7	-1.43	-0.43	0.38	0.94	1.44	2.54	8	26	31	18	10	7	1	0	40	34	11	6	6	3
Ext. Asym	2	1.04						85	15						87	13					
	3	0.58	1.13					72	15	13					80	9	11				
	4	0.28	0.71	1.23				61	15	13	11				72	10	7	10			
	5	0.05	0.44	0.84	1.34			52	15	13	11	9			64	12	8	6	9		
	6	-0.13	0.25	0.61	0.99	1.48		45	15	13	11	9	7		56	15	9	7	5	8	
	7	-0.25	0.13	0.47	0.81	1.18	1.64	40	15	13	11	9	7	5	51	16	10	7	5	4	7
Mod. Asym-Alt	2	-0.36						36	64						45	55					
	3	-0.76	0.50					22	47	31					19	58	22				
	4	-1.66	-0.79	0.31				5	17	41	38				0	17	55	27			
	5	-2.05	-1.16	-0.39	0.70			2	10	23	41	24			0	2	40	39	18		
	6	-2.33	-1.44	-0.81	-0.08	1.05		1	7	14	26	38	15		0	0	16	42	29	12	
	7	-2.54	-1.44	-0.94	-0.38	0.43	1.43	1	7	10	18	31	26	8	0	0	9	34	33	16	8
Ext. Asym-Alt	2	-1.04						15	85						5	95					
	3	-1.13	-0.58					13	15	72					3	28	69				
	4	-1.23	-0.71	-0.28				11	13	15	61				2	21	26	51			
	5	-1.34	-0.84	-0.44	-0.05			9	11	13	15	52			1	14	26	20	40		
	6	-1.48	-0.99	-0.61	-0.25	0.13		7	9	11	13	15	45		0	7	22	21	16	33	
	7	-1.64	-1.18	-0.81	-0.47	-0.13	0.25	5	7	9	11	13	15	40	0	2	14	22	18	15	29

Note. Mod. Asym = Moderate Asymmetry; Mod. Asym-Alt = Moderate Asymmetry-Alternating; Ext. Asym = Exteme Asymmetry; Ext. Asym-Alt = Extreme Asymmetry-Alternating. ML = robust normal-theory maximum likelihood; ULS = robust categorical least squares.

Number of nonconverged cases per 1000 replications

Underlying distribution = Normal

		Ext. Asym.								Ext. Asym.-Alt.								Mod. Asym.								Mod. Asym.-Alt.								Symmetric							
		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600	
Model	cats	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS
1																																										
	2	237	80	101	48	4	2	0	0	236	79	106	31	5	1	0	0	48	14	10	1	0	0	0	0	42	9	14	2	0	0	0	0	29	9	8	0	0	0	0	0
	3	60	20	14	2	0	0	0	0	59	12	6	2	0	0	0	0	1	1	0	0	0	0	0	0	3	1	0	0	0	0	0	0	9	3	0	0	0	0	0	0
	4	18	7	2	0	0	0	0	0	17	5	0	0	0	0	0	0	6	0	0	0	0	0	0	0	9	0	0	0	0	0	0	0	5	0	0	0	0	0	0	0
	5	6	3	2	0	0	0	0	0	10	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	4	2	0	0	0	0	1	0	1	0	0	0	0	0	1	0
	6	5	1	0	0	0	0	0	0	4	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	7	5	1	0	0	0	0	1	0	6	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0
2																																										
	2	8	1	1	1	0	0	0	0	8	3	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	1	0	0	0
	3	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0
	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	2	0
	5	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
	6	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	1	0

Underlying Distribution = Skew 2, Kurtosis 7

		Ext. Aym.								Ext. Asym.-Alt.								Mod. Asym.								Mod. Asym.-Alt.								Symmetric							
		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600	
Model	cats	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS
1																																										
	2	205	66	92	35	2	1	0	0	431	84	279	95	41	5	2	1	57	11	9	1	0	0	0	0	23	3	5	3	0	0	0	0	8	2	1	0	0	0	1	0
	3	78	59	12	6	0	0	0	0	42	19	5	1	0	0	0	0	3	0	0	0	0	0	0	0	3	1	1	0	0	0	0	0	5	0	0	0	0	0	0	0
	4	32	6	2	0	0	0	0	0	8	3	1	0	0	0	0	0	4	0	0	0	0	0	0	0	3	0	1	0	0	0	1	0	3	0	0	0	0	0	0	0
	5	7	2	0	0	0	0	0	0	3	1	1	0	0	0	0	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	6	3	1	1	0	0	0	0	0	3	0	0	0	0	0	0	0	7	0	0	0	0	0	0	0	4	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0
	7	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
2																																										
	2	22	0	0	0	0	0	1	0	153	43	23	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0	0	1	0	0	0
	3	0	0	0	0	0	0	2	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
	4	1	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1	0
	5	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0
	6	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	2	0
	7	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0

Note. Mod. Asym = Moderate Asymmetry; Mod. Asym-Alt = Moderate Asymmetry-Alternating; Ext. Asym = Exteme Asymmetry; Ext. Asym-Alt = Extreme Asymmetry-Alternating. ML = robust normal-theory maximum likelihood; ULS = robust categorical least squares.

Number of Improper solutions per 1000 replications

Underlying Distribution = Normal

		Ext. Asym.								Ext. Asym.-Alt								Mod. Asym.								Mod. Asym.-Alt								Symmetric							
		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600	
Model	cats	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS
1																																									
	2	197	382	107	281	7	51	0	9	125	279	60	203	7	83	0	23	78	160	22	73	0	5	0	0	60	183	17	75	1	6	0	2	57	139	16	76	1	1	0	0
	3	86	151	35	80	1	4	0	0	55	243	23	114	1	6	0	0	31	43	7	16	0	0	0	0	21	36	3	4	0	0	0	0	24	43	5	23	0	0	0	0
	4	52	81	13	19	0	0	0	0	56	91	10	41	0	2	0	0	27	38	5	9	0	0	0	0	24	39	6	12	0	0	0	0	17	19	2	1	0	0	0	0
	5	39	40	10	16	0	0	0	0	33	60	5	11	0	0	0	0	18	12	2	4	0	0	0	0	21	27	2	4	0	0	0	0	16	20	5	6	0	0	0	0
	6	29	31	5	4	0	0	0	0	29	36	4	6	0	0	0	0	25	20	2	2	0	0	0	0	21	18	1	1	0	0	0	0	17	13	1	1	0	0	0	0
	7	21	26	6	5	0	0	0	0	21	21	2	6	0	0	0	0	18	11	4	2	0	0	0	0	23	15	6	3	0	0	0	0	17	15	2	1	0	0	0	0
2																																									
	2	22	117	1	31	0	0	0	0	5	35	1	4	0	1	0	0	1	10	0	1	0	0	0	0	1	23	0	1	0	0	0	0	1	4	0	1	0	0	0	0
	3	1	7	0	2	0	0	0	0	1	95	0	10	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	4	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Underlying Distribution = Skew 2, Kurtosis 7

		Ext. Asym.								Ext. Asym.-Alt.								Mod. Asym.-Alt								Mod. Asym.-Alt								Symmetric							
		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600	
Model	cats	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS
1																																									
	2	212	422	135	277	8	60	0	12	181	584	125	340	33	67	5	25	85	217	18	98	0	10	0	0	54	183	10	87	0	6	0	1	38	136	8	47	0	7	0	0
	3	146	288	48	119	0	15	0	0	55	414	17	217	0	17	0	0	21	46	3	9	0	0	0	0	20	46	2	7	0	0	0	0	21	67	3	27	0	0	0	0
	4	90	141	22	49	0	2	0	0	29	116	4	22	0	3	0	0	31	43	4	10	0	0	0	0	18	39	0	6	0	0	0	0	30	56	7	19	0	0	0	0
	5	59	77	6	18	0	1	0	0	18	61	2	17	0	0	0	0	21	25	0	6	0	0	0	0	15	19	2	7	0	0	0	0	10	30	4	5	0	0	0	0
	6	52	49	8	18	0	0	0	0	15	28	4	10	0	0	0	0	36	32	5	9	0	0	0	0	26	27	2	5	0	0	0	0	9	20	0	3	0	0	0	0
	7	41	39	7	7	0	0	0	0	18	29	3	5	0	0	0	0	35	23	4	5	0	0	0	0	12	17	1	6	0	0	0	0	10	6	1	3	0	0	0	0
2																																									
	2	23	173	2	57	0	2	0	0	107	472	29	88	0	0	0	0	0	26	0	2	0	0	0	0	0	31	0	4	0	0	0	0	0	8	0	1	0	0	0	0
	3	1	66	0	5	0	0	0	0	1	248	0	71	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0	0
	4	2	6	0	1	0	0	0	0	0	9	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0
	5	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	7	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Note. Mod. Asym = Moderate Asymmetry; Mod. Asym-Alt = Moderate Asymmetry-Alternating; Ext. Asym = Exteme Asymmetry; Ext. Asym-Alt = Extreme Asymmetry-Alternating. ML = robust normal-theory maximum likelihood; ULS = robust categorical least squares.

Parameter Bias (bias = $\bar{\theta} - \theta$), Model 1, Underlying Distribution = Normal

		Ext. Asym.								Ext. Asym.-Alt.								Mod. Asym.							
		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600	
param.	cats	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS
λ = .3																									
	2	-.112	-.009	-.107	-.010	-.107	-.010	-.104	-.006	-.090	.025	-.088	.022	-.093	.009	-.094	-.001	-.066	.008	-.068	.003	-.070	-.002	-.068	-.001
	3	-.066	.008	-.070	-.003	-.070	-.005	-.069	-.003	-.070	-.003	-.067	-.001	-.059	.000	-.060	.001	-.027	.011	-.031	.003	-.029	.004	-.031	.001
	4	-.046	.008	-.053	-.004	-.052	-.003	-.050	-.001	-.043	.007	-.045	.003	-.044	-.001	-.043	.001	-.024	.010	-.029	.001	-.028	.002	-.028	.001
	5	-.035	.010	-.040	-.002	-.040	-.001	-.039	-.001	-.036	.003	-.033	.003	-.032	.003	-.034	.000	-.015	.008	-.020	.001	-.020	.001	-.020	.000
	6	-.026	.009	-.031	-.001	-.031	.001	-.031	-.001	-.028	.005	-.026	.003	-.026	.000	-.029	-.002	-.010	.010	-.017	.001	-.016	.002	-.017	-.002
	7	-.021	.009	-.027	.001	-.027	.001	-.027	.000	-.023	.003	-.025	-.001	-.022	.002	-.023	.001	-.008	.009	-.012	.002	-.013	.001	-.013	-.001
λ = .4																									
	2	-.139	-.017	-.134	-.006	-.135	-.010	-.130	-.003	-.154	-.002	-.151	.018	-.151	.013	-.150	.007	-.092	.006	-.093	-.001	-.090	-.003	-.085	.002
	3	-.095	-.007	-.088	-.001	-.087	-.003	-.085	-.002	-.096	.018	-.098	.011	-.093	.007	-.098	-.001	-.049	-.003	-.044	-.001	-.043	-.001	-.040	.001
	4	-.069	-.002	-.064	-.001	-.063	-.003	-.061	.000	-.072	.005	-.073	.001	-.072	-.002	-.070	-.001	-.042	.000	-.038	.000	-.037	-.001	-.035	.000
	5	-.056	-.003	-.049	.001	-.050	-.002	-.047	.000	-.051	.009	-.054	.004	-.049	.005	-.051	.002	-.031	.000	-.028	-.002	-.027	-.002	-.024	.001
	6	-.045	-.002	-.040	.001	-.040	-.002	-.038	.000	-.048	-.001	-.045	.000	-.046	-.004	-.043	-.002	-.026	.001	-.023	-.002	-.023	-.002	-.020	.001
	7	-.039	-.002	-.035	-.001	-.035	-.002	-.032	.000	-.043	-.002	-.033	.006	-.038	-.001	-.036	.001	-.021	.000	-.019	-.001	-.017	-.001	-.015	.001
λ = .5																									
	2	-.129	.000	-.146	.010	-.153	-.004	-.154	-.004	-.141	-.001	-.150	.017	-.149	.009	-.147	.003	-.101	.011	-.107	.004	-.105	.002	-.107	-.002
	3	-.094	.004	-.102	.002	-.098	.000	-.099	-.002	-.102	.005	-.095	.006	-.095	-.002	-.091	.002	-.054	.000	-.051	.003	-.050	.000	-.052	-.002
	4	-.069	.006	-.073	.002	-.072	-.001	-.072	-.002	-.066	.009	-.066	.004	-.064	.004	-.067	-.001	-.042	.003	-.041	.004	-.044	-.001	-.045	-.003
	5	-.053	.004	-.055	.003	-.055	-.001	-.056	-.002	-.054	.004	-.055	.000	-.055	-.004	-.051	.000	-.032	.002	-.032	.001	-.031	.000	-.031	-.001
	6	-.044	.003	-.045	.002	-.044	.000	-.046	-.002	-.045	.001	-.040	.002	-.042	-.001	-.040	.001	-.024	.003	-.026	.001	-.024	.002	-.026	-.001
	7	-.037	.002	-.038	.002	-.038	-.001	-.039	-.002	-.042	-.004	-.037	.000	-.035	.000	-.036	.000	-.019	.002	-.020	.001	-.019	.001	-.020	-.002
λ = .6																									
	2	-.155	-.017	-.157	-.016	-.172	-.008	-.168	-.001	-.269	-.088	-.259	-.025	-.268	.016	-.271	.008	-.120	-.007	-.121	-.005	-.118	.001	-.123	-.001
	3	-.102	-.006	-.109	-.007	-.107	-.003	-.107	-.001	-.177	-.002	-.178	.003	-.178	.003	-.179	.001	-.055	.003	-.061	-.003	-.059	-.001	-.060	-.001
	4	-.077	-.003	-.079	-.006	-.076	-.001	-.078	-.002	-.128	.003	-.131	-.003	-.132	-.004	-.126	.003	-.048	-.001	-.051	-.004	-.048	-.001	-.049	-.001
	5	-.059	-.001	-.061	-.005	-.058	-.001	-.060	-.001	-.095	.001	-.092	.003	-.093	.003	-.095	.002	-.037	-.002	-.036	-.003	-.034	-.001	-.036	-.002
	6	-.047	-.001	-.049	-.005	-.046	-.001	-.048	-.001	-.074	.001	-.081	-.005	-.077	-.001	-.076	.000	-.030	.001	-.030	-.003	-.028	-.001	-.029	-.001
	7	-.042	-.003	-.042	-.005	-.039	-.001	-.041	-.001	-.065	-.002	-.063	.002	-.063	.001	-.066	-.001	-.022	.000	-.024	-.003	-.022	-.001	-.022	-.001
λ = .7																									
	2	-.156	-.075	-.171	-.049	-.172	-.002	-.188	-.007	-.242	-.102	-.247	-.069	-.245	-.010	-.246	.002	-.121	-.029	-.135	-.017	-.134	.000	-.139	-.004
	3	-.103	-.035	-.106	-.018	-.109	.003	-.119	-.004	-.152	-.035	-.159	-.021	-.163	-.003	-.160	.002	-.056	-.008	-.065	-.007	-.063	.002	-.067	-.002
	4	-.074	-.021	-.075	-.008	-.078	.004	-.085	-.002	-.113	-.023	-.108	-.006	-.111	.002	-.116	-.002	-.046	-.009	-.052	-.006	-.049	.001	-.054	-.001
	5	-.058	-.015	-.062	-.010	-.059	.002	-.066	-.002	-.081	-.015	-.086	-.008	-.090	-.004	-.086	.000	-.030	-.004	-.038	-.006	-.034	.002	-.039	-.001
	6	-.046	-.014	-.048	-.006	-.046	.002	-.052	-.002	-.069	-.017	-.067	-.006	-.067	.000	-.068	.000	-.026	-.008	-.031	-.006	-.026	.002	-.032	-.001
	7	-.038	-.011	-.041	-.008	-.039	.002	-.044	-.002	-.055	-.012	-.061	-.009	-.062	-.004	-.060	.000	-.018	-.006	-.022	-.004	-.019	.002	-.025	-.002
ϕ = .3																									
	2	-.014	.033	-.036	.030	-.041	.002	-.038	-.001	.079	.121	.026	.076	.014	.021	.019	.014	.003	.054	-.005	.036	-.016	.004	-.012	.004
	3	-.013	.035	-.027	.026	-.026	.004	-.025	.001	.020	.053	.006	.031	.012	.013	.008	.005	.000	.032	-.005	.014	-.004	.006	-.002	.004
	4	-.013	.036	-.017	.022	-.020	.003	-.018	.002	.011	.040	.007	.024	.003	.006	.008	.007	.000	.029	-.006	.018	-.008	.004	-.004	.004
	5	-.007	.034	-.009	.023	-.015	.004	-.013	.003	-.010	.015	.004	.017	.001	.005	.001	.002	-.002	.024	-.001	.018	-.006	.004	-.004	.003
	6	-.008	.029	-.009	.017	-.013	.004	-.011	.003	-.001	.026	-.003	.012	.000	.005	.007	.008	.001	.028	.003	.020	-.004	.005	-.003	.004
	7	-.001	.029	-.006	.019	-.012	.003	-.009	.004	.001	.021	.007	.022	.002	.006	.002	.004	.003	.025	.001	.016	-.003	.005	-.002	.004

		Mod. Asym.-Alt.								Symmetric							
		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600	
param.	cats	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS
λ = .3																	
	2	-.066	.014	-.066	.003	-.066	.002	-.063	.003	-.062	.009	-.063	.003	-.062	.001	-.062	.000
	3	-.037	-.002	-.032	.002	-.032	.000	-.031	.001	-.035	.004	-.036	.001	-.031	.004	-.035	-.001
	4	-.032	-.003	-.027	.002	-.027	.000	-.026	.001	-.021	.005	-.021	.002	-.020	.002	-.022	-.002
	5	-.019	.003	-.014	.008	-.016	.003	-.018	.001	-.014	.003	-.013	.002	-.013	.001	-.014	.000
	6	-.019	-.001	-.016	.001	-.016	-.001	-.015	.000	-.010	.004	-.011	.001	-.009	.002	-.011	-.001
	7	-.013	.003	-.014	-.001	-.011	.001	-.011	.001	-.007	.004	-.007	.001	-.006	.002	-.008	-.001
λ = .4																	
	2	-.097	.001	-.087	.009	-.089	.002	-.089	.001	-.083	.010	-.083	.004	-.082	-.001	-.082	-.001
	3	-.041	.007	-.040	.005	-.040	.002	-.042	.001	-.049	.004	-.051	.000	-.048	-.003	-.045	.001
	4	-.041	.005	-.043	-.003	-.039	.000	-.037	.002	-.030	.001	-.030	.000	-.029	-.001	-.028	-.001
	5	-.028	.003	-.027	.001	-.028	-.002	-.025	.002	-.021	.003	-.022	-.002	-.020	-.002	-.018	.001
	6	-.026	.000	-.021	.003	-.021	.001	-.022	.000	-.017	.000	-.016	-.001	-.015	-.002	-.013	.000
	7	-.019	.001	-.022	-.004	-.016	.002	-.017	-.001	-.014	.000	-.014	-.003	-.011	-.001	-.009	.001
λ = .5																	
	2	-.105	.002	-.109	-.001	-.105	-.001	-.107	-.002	-.101	.010	-.099	.006	-.098	.001	-.100	-.002
	3	-.053	.000	-.048	.002	-.048	.002	-.051	-.001	-.056	.006	-.058	.003	-.056	.002	-.058	-.001
	4	-.043	.006	-.044	.001	-.041	.000	-.043	-.003	-.036	.004	-.035	.002	-.034	.000	-.035	-.001
	5	-.035	-.002	-.030	.000	-.030	.000	-.029	.000	-.027	.002	-.024	.002	-.022	.001	-.024	-.001
	6	-.022	.007	-.022	.005	-.026	-.002	-.024	-.001	-.018	.004	-.017	.002	-.016	.000	-.018	-.001
	7	-.016	.006	-.017	.004	-.017	.002	-.019	-.001	-.015	.000	-.014	.000	-.013	.000	-.014	-.002
λ = .6																	
	2	-.137	-.005	-.138	.001	-.137	-.001	-.137	.001	-.110	-.003	-.116	-.003	-.116	-.003	-.116	-.003
	3	-.056	.004	-.059	-.001	-.059	-.001	-.068	-.002	-.069	-.001	-.069	-.001	-.068	-.001	-.069	-.001
	4	-.065	.001	-.063	.003	-.065	.000	-.066	-.001	-.041	.001	-.042	-.003	-.041	-.001	-.042	-.001
	5	-.043	.003	-.044	.001	-.045	-.001	-.046	-.001	-.030	-.003	-.029	-.003	-.027	.000	-.028	-.001
	6	-.040	-.002	-.038	-.001	-.037	.000	-.038	.000	-.022	-.003	-.021	-.003	-.020	-.001	-.020	-.001
	7	-.026	-.001	-.026	.001	-.029	-.002	-.028	-.001	-.016	-.003	-.016	-.003	-.015	-.001	-.015	-.001
λ = .7																	
	2	-.139	-.004	-.131	-.031	-.138	-.012	-.145	.000	-.148	.000	-.120	-.027	-.124	-.017	-.127	.000	-.130	.000
	3	-.067	-.002	-.064	-.013	-.064	-.006	-.068	-.003	-.066	.000	-.079	-.019	-.078	-.011	-.074	.002	-.079	-.002
	4	-.054	-.001	-.051	-.008	-.062	-.008	-.064	-.002	-.064	.001	-.046	-.014	-.047	-.006	-.042	.003	-.047	-.001
	5	-.039	-.001	-.040	-.006	-.042	-.002	-.046	-.002	-.044	.000	-.029	-.012	-.030	-.006	-.027	.002	-.032	-.002
	6	-.032	-.001	-.033	-.008	-.035	-.004	-.035	.001	-.035	.000	-.022	-.012	-.023	-.005	-.018	.002	-.022	.000
	7	-.022	-.004	-.019	.002	-.025	-.002	-.027	-.010	-.024	-.002	-.027	-.002	-.026	.001	-.016	-.011	-.016	-.005	-.012	.002	-.017	-.001
ϕ = .3																	
	2	-.005	.036	-.016	.004	-.012	.004	-.007	.055	-.002	.028	-.009	.003	-.006	.002	-.001	.052	.001	.037	-.012	.004	-.007	.005
	3	-.005	.014	-.004	.006	-.002	.004	-.012	.021	.002	.021	-.004	.005	-.002	.004	.004	.036	.001	.020	.001	.009	.001	.005
	4	-.006	.018	-.008	.004	-.004	.004	.000	.021	.007	.022	.003	.008	.000	.002	.008	.033	.004	.020	-.001	.005	.000	.004
	5	-.001	.018	-.006	.004	-.004	.003	-.006	.016	.002	.015	.003	.008	-.001	.002	.003	.027	.000	.014	-.001	.005	.001	.005
	6	.003	.020	-.004	.005	-.003	.004	.003	.026	.001	.014	.001	.006	.001	.003	.007	.029	.003	.016	-.001	.005	.001	.005
	7	.001	.016	-.003	.005	-.002	.004	-.007	.015	.004	.008	.001	.007	.000	.002	.006	.028	.002	.016	-.002	.004	.001	.005

Note. Mod. Asym = Moderate Asymmetry; Mod. Asym-Alt = Moderate Asymmetry-Alternating; Ext. Asym = Exteme Asymmetry; Ext. Asym-Alt = Extreme Asymmetry-Alternating. ML = robust normal-theory maximum likelihood; ULS = robust categorical least squares.

Parameter Bias (bias = $\bar{\theta} - \theta$), Model 1, Underlying Distribution = Skew 2, Kurtosis 7

		Ext. Asym.								Ext. Asym.-Alt.								Mod. Asym.							
		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600	
param.	cats	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS
λ = .3																									
	2	-.103	.021	-.097	.003	-.093	.020	-.099	.016	-.113	.028	-.132	.041	-.144	.045	-.137	.045	-.068	.016	-.060	.026	-.060	.024	-.061	.024
	3	-.075	.016	-.069	.017	-.066	.023	-.068	.023	-.052	.039	-.049	.026	-.043	.030	-.044	.026	-.015	.023	-.010	.028	-.010	.026	-.010	.026
	4	-.057	.013	-.050	.022	-.047	.025	-.050	.023	-.027	.033	-.021	.029	-.027	.024	-.025	.024	-.020	.023	-.012	.029	-.014	.025	-.014	.026
	5	-.044	.019	-.034	.024	-.034	.025	-.036	.024	-.018	.025	-.018	.021	-.014	.026	-.014	.025	-.010	.024	-.003	.030	-.004	.028	-.007	.025
	6	-.033	.020	-.024	.027	-.024	.025	-.026	.024	-.013	.022	-.009	.026	-.008	.024	-.006	.027	-.027	.026	-.019	.027	-.018	.027	-.020	.026
	7	-.026	.021	-.017	.028	-.018	.026	-.020	.025	-.008	.024	-.005	.023	-.002	.025	-.004	.024	-.016	.025	-.007	.029	-.008	.026	-.010	.026
λ = .4																									
	2	-.117	.034	-.131	.009	-.122	.018	-.120	.027	-.205	-.231	-.223	-.088	-.228	.022	-.221	.041	-.082	.034	-.081	.031	-.076	.032	-.075	.033
	3	-.083	.030	-.091	.020	-.083	.026	-.082	.030	-.086	.058	-.088	.047	-.087	.033	-.089	.030	-.017	.034	-.020	.028	-.017	.029	-.016	.031
	4	-.061	.032	-.066	.024	-.059	.029	-.058	.032	-.055	.035	-.054	.031	-.052	.029	-.051	.031	-.020	.031	-.023	.028	-.019	.030	-.018	.031
	5	-.047	.031	-.047	.027	-.042	.031	-.040	.032	-.033	.035	-.035	.029	-.034	.026	-.032	.030	-.012	.032	-.014	.030	-.010	.030	-.008	.032
	6	-.033	.029	-.035	.028	-.030	.031	-.029	.031	-.021	.034	-.019	.033	-.019	.031	-.021	.027	-.027	.032	-.030	.029	-.025	.031	-.024	.032
	7	-.025	.030	-.028	.027	-.022	.031	-.021	.032	-.016	.032	-.014	.032	-.013	.029	-.012	.031	-.015	.031	-.017	.028	-.013	.030	-.011	.031
λ = .5																									
	2	-.133	.027	-.138	.029	-.142	.024	-.138	.027	-.203	-.097	-.210	-.039	-.241	.014	-.226	.039	-.100	.023	-.100	.029	-.095	.030	-.092	.034
	3	-.098	.025	-.102	.028	-.097	.027	-.094	.032	-.083	.041	-.082	.041	-.078	.031	-.077	.030	-.032	.029	-.024	.035	-.027	.028	-.024	.031
	4	-.077	.024	-.074	.030	-.071	.027	-.068	.033	-.048	.038	-.048	.031	-.044	.032	-.045	.032	-.033	.027	-.027	.031	-.027	.028	-.024	.031
	5	-.057	.026	-.053	.030	-.051	.028	-.049	.032	-.034	.031	-.029	.032	-.029	.030	-.027	.032	-.020	.030	-.017	.032	-.016	.030	-.014	.033
	6	-.045	.025	-.039	.030	-.037	.029	-.035	.031	-.018	.035	-.024	.026	-.019	.031	-.017	.030	-.039	.029	-.034	.031	-.033	.029	-.031	.032
	7	-.035	.027	-.031	.030	-.029	.028	-.027	.032	-.017	.029	-.016	.027	-.012	.030	-.012	.029	-.023	.029	-.017	.035	-.017	.030	-.016	.032
λ = .6																									
	2	-.139	.004	-.146	.016	-.158	.024	-.152	.029	-.382	-.404	-.396	-.232	-.389	-.087	-.381	-.027	-.109	.022	-.107	.031	-.111	.028	-.111	.028
	3	-.097	.027	-.106	.024	-.107	.027	-.104	.030	-.176	.033	-.180	.039	-.180	.036	-.181	.034	-.037	.027	-.036	.029	-.033	.030	-.033	.031
	4	-.078	.019	-.076	.031	-.077	.029	-.076	.029	-.116	.032	-.112	.036	-.115	.030	-.112	.033	-.036	.024	-.031	.028	-.030	.030	-.030	.030
	5	-.060	.021	-.055	.029	-.056	.029	-.055	.029	-.077	.029	-.076	.032	-.076	.030	-.076	.029	-.028	.026	-.022	.031	-.022	.030	-.021	.030
	6	-.045	.022	-.040	.030	-.041	.029	-.040	.030	-.052	.030	-.052	.030	-.054	.028	-.051	.032	-.043	.025	-.037	.032	-.037	.031	-.037	.028
	7	-.037	.022	-.031	.030	-.031	.029	-.031	.029	-.038	.033	-.044	.025	-.040	.031	-.040	.032	-.028	.024	-.020	.030	-.020	.031	-.020	.030
λ = .7																									
	2	-.118	-.037	-.138	-.013	-.163	.018	-.168	.027	-.351	-.282	-.367	-.177	-.370	-.073	-.363	-.033	-.111	-.010	-.114	.015	-.124	.027	-.128	.026
	3	-.096	-.003	-.097	.008	-.112	.026	-.114	.029	-.144	-.004	-.147	.011	-.154	.029	-.154	.032	-.039	.020	-.039	.027	-.040	.031	-.041	.031
	4	-.070	.004	-.073	.020	-.082	.028	-.083	.028	-.091	.015	-.098	.022	-.098	.029	-.097	.031	-.030	.021	-.033	.025	-.034	.031	-.035	.030
	5	-.043	.014	-.054	.024	-.058	.029	-.060	.029	-.061	.013	-.056	.032	-.063	.032	-.067	.029	-.021	.022	-.023	.026	-.025	.029	-.026	.030
	6	-.033	.019	-.039	.024	-.043	.029	-.043	.029	-.044	.020	-.043	.025	-.047	.028	-.045	.031	-.032	.025	-.037	.028	-.039	.031	-.041	.029
	7	-.025	.020	-.030	.024	-.032	.030	-.033	.030	-.029	.021	-.028	.031	-.035	.031	-.037	.028	-.017	.023	-.021	.025	-.021	.032	-.022	.030
ϕ = .3																									
	2	-.020	.100	-.037	.024	-.038	.010	-.041	.006	.176	.033	.065	.162	.004	.128	-.029	.076	-.011	.057	-.016	.033	-.007	.021	-.007	.018
	3	-.030	.055	-.034	.030	-.026	.016	-.026	.014	.013	.065	.018	.045	.023	.021	.019	.014	.007	.033	.012	.030	.008	.017	.009	.016
	4	-.025	.047	-.026	.022	-.016	.019	-.019	.015	.007	.034	.020	.030	.020	.021	.014	.013	.001	.039	.004	.031	.000	.017	.000	.017
	5	-.019	.040	-.015	.027	-.011	.019	-.012	.015	.014	.037	.004	.018	.014	.018	.012	.013	.000	.027	.002	.024	.004	.016	.005	.017
	6	-.015	.036	-.009	.029	-.007	.017	-.008	.016	.013	.034	.009	.026	.009	.015	.015	.017	-.004	.036	-.006	.027	-.004	.017	-.005	.016
	7	-.008	.039	-.008	.027	-.005	.018	-.006	.017	.013	.034	.013	.027	.011	.015	.014	.018	.000	.034	-.002	.028	-.001	.017	-.001	.017

		Mod. Asym.-Alt.								Symmetric							
		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600	
param.	cats	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS
λ = .3																	
	2	-.043	.044	-.048	.030	-.051	.023	-.051	.022	-.049	.025	-.046	.028	-.048	.024	-.048	.023
	3	-.013	.031	-.011	.026	-.011	.024	-.012	.025	-.026	.032	-.023	.030	-.021	.027	-.023	.026
	4	-.010	.027	-.013	.026	-.012	.024	-.011	.025	-.026	.025	-.023	.027	-.021	.027	-.024	.024
	5	-.004	.028	-.002	.029	-.007	.023	-.004	.026	-.005	.028	-.002	.029	-.004	.025	-.003	.026
	6	-.011	.024	-.005	.029	-.006	.026	-.007	.025	.002	.029	.004	.029	.002	.025	.001	.025
	7	.000	.027	-.002	.023	-.001	.024	.002	.027	.000	.027	.003	.028	.003	.027	.001	.026
λ = .4																	
	2	-.076	.038	-.073	.034	-.073	.029	-.072	.029	-.063	.037	-.062	.036	-.060	.033	-.060	.033
	3	-.024	.030	-.022	.027	-.017	.031	-.018	.029	-.039	.030	-.036	.029	-.033	.030	-.032	.031
	4	-.023	.031	-.021	.032	-.022	.028	-.020	.030	-.034	.035	-.031	.033	-.029	.032	-.028	.032
	5	-.016	.028	-.012	.030	-.012	.027	-.011	.029	-.013	.027	-.010	.029	-.006	.031	-.005	.031
	6	-.014	.031	-.015	.030	-.013	.030	-.013	.030	-.004	.030	-.002	.030	.001	.031	.001	.032
	7	-.004	.032	-.007	.029	-.002	.031	-.006	.027	-.004	.030	-.003	.029	.000	.030	.001	.031
λ = .5																	
	2	-.087	.035	-.087	.031	-.084	.030	-.082	.033	-.082	.031	-.081	.031	-.079	.030	-.078	.032
	3	-.026	.037	-.025	.036	-.027	.031	-.027	.032	-.049	.037	-.048	.034	-.049	.029	-.046	.033
	4	-.026	.033	-.025	.032	-.024	.030	-.024	.030	-.045	.032	-.041	.033	-.039	.031	-.039	.032
	5	-.020	.030	-.015	.033	-.016	.029	-.014	.032	-.013	.036	-.011	.035	-.013	.029	-.012	.031
	6	-.014	.038	-.020	.029	-.015	.033	-.015	.030	-.007	.034	-.006	.032	-.006	.029	-.004	.032
	7	-.003	.035	-.005	.032	-.007	.029	-.005	.031	-.007	.032	-.005	.032	-.005	.029	-.003	.032
λ = .6																	
	2	-.121	.025	-.124	.033	-.123	.029	-.124	.028	-.094	.029	-.090	.033	-.093	.032	-.095	.028
	3	-.037	.033	-.037	.031	-.037	.028	-.033	.032	-.035	.029	-.036	.029	-.033	.032	-.012	.029
	4	-.050	.029	-.048	.028	-.047	.030	-.046	.031	-.050	.029	-.048	.032	-.049	.031	-.048	.030
	5	-.029	.029	-.032	.026	-.027	.030	-.027	.030	-.020	.029	-.019	.030	-.019	.031	-.018	.030
	6	-.033	.032	-.035	.029	-.036	.029	-.033	.032	-.012	.029	-.011	.031	-.010	.032	-.010	.029
	7	-.016	.033	-.021	.026	-.016	.031	-.018	.030	-.011	.029	-.009	.031	-.009	.031	-.009	.029
λ = .7																	
	2	-.124	-.001	-.120	.019	-.129	.030	-.126	.035	-.095	.004	-.106	.018	-.108	.027	-.108	.031
	3	-.046	.016	-.048	.024	-.046	.031	-.046	.031	-.069	.018	-.074	.023	-.075	.030	-.076	.030
	4	-.041	.025	-.047	.027	-.048	.031	-.048	.031	-.049	.019	-.053	.026	-.055	.030	-.055	.031
	5	-.026	.030	-.030	.026	-.030	.032	-.030	.031	-.019	.024	-.020	.029	-.020	.032	-.022	.031
	6	-.026	.023	-.030	.026	-.030	.032	-.034	.031	-.013	.022	-.013	.027	-.013	.030	-.014	.030
	7	-.033	.021	-.035	.024	-.032	.032	-.034	.031	-.013	.022	-.010	.027	-.009	.031	-.011	.030
ϕ = .3																	
	2	.006	.058	.008	.039	.018	.030	.006	.015	.006	.058	.004	.039	.000	.019	.002	.017
	3	.012	.039	.005	.021	.008	.014	.010	.015	.007	.037	.014	.032	.009	.016	.013	.017
	4	.012	.037	.008	.023	.013	.020	.008	.012	.003	.046	.004	.033	.002	.018	.002	.015
	5	.010	.034	.004	.018	.008	.016	.009	.014	.007	.036	.009	.028	.005	.015	.007	.016
	6	.012	.038	.005	.022	.007	.015	.010	.015	.007	.032	.009	.027	.006	.014	.008	.016
	7	.003	.026	.008	.025	.011	.018	.007	.013	.006	.034	.009	.029	.006	.016	.007	.017

Note. Mod. Asym = Moderate Asymmetry; Mod. Asym-Alt = Moderate Asymmetry-Alternating; Ext. Asym = Exteme Asymmetry; Ext. Asym-Alt = Extreme Asymmetry-Alternating. ML = robust normal-theory maximum likelihood; ULS = robust categorical least squares.

Parameter Bias (bias = $\bar{\theta} - \theta$), Model 2, Underlying Distribution = Normal

		Ext. Asym.								Ext. Asym.-Alt.								Mod. Asym.							
		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600	
param.	cats	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS
λ = .3																									
	2	-.114	-.035	-.111	-.031	-.106	-.012	-.104	-.004	-.106	-.002	-.105	.005	-.105	.001	-.100	.004	-.071	-.005	-.068	-.001	-.066	.001	-.067	.000
	3	-.071	-.011	-.071	-.009	-.070	-.006	-.068	-.001	-.070	-.002	-.064	.002	-.064	.002	-.066	-.001	-.031	.002	-.034	-.002	-.034	-.003	-.030	.001
	4	-.051	-.005	-.053	-.006	-.050	-.001	-.049	.000	-.051	-.002	-.048	.000	-.048	-.001	-.047	.000	-.030	-.002	-.029	-.002	-.031	-.003	-.029	-.001
	5	-.037	-.001	-.039	-.003	-.037	.001	-.038	.000	-.033	.006	-.038	.000	-.036	.000	-.036	.001	-.021	-.002	-.020	.000	-.022	-.002	-.020	-.001
	6	-.032	-.002	-.034	-.003	-.031	-.001	-.032	-.001	-.026	.005	-.030	.000	-.029	.001	-.029	.000	-.019	-.002	-.016	.001	-.016	.000	-.016	.000
	7	-.027	.000	-.029	-.002	-.026	.000	-.025	.001	-.030	-.003	-.026	-.001	-.024	.001	-.025	.000	-.016	-.003	-.013	.000	-.013	.000	-.012	.000
λ = .4																									
	2	-.138	-.026	-.141	-.030	-.132	-.008	-.130	-.003	-.147	-.018	-.139	.002	-.137	.007	-.137	.002	-.090	-.004	-.087	.000	-.088	-.001	-.088	-.001
	3	-.090	-.011	-.085	-.004	-.086	-.003	-.085	-.002	-.089	.001	-.088	.001	-.087	.001	-.087	.001	-.039	.002	-.041	.001	-.041	.000	-.041	.000
	4	-.064	-.005	-.064	-.004	-.062	-.001	-.061	.000	-.067	-.001	-.064	.000	-.064	-.001	-.063	.000	-.039	-.004	-.035	.000	-.037	-.001	-.035	.001
	5	-.050	-.004	-.048	-.002	-.048	-.001	-.047	.000	-.050	.000	-.048	.001	-.048	.000	-.049	-.001	-.029	-.003	-.027	-.001	-.026	-.001	-.025	.000
	6	-.039	-.002	-.038	-.002	-.037	.000	-.038	.000	-.042	-.003	-.038	.001	-.039	.000	-.040	-.001	-.021	.001	-.025	-.003	-.022	-.001	-.020	.000
	7	-.035	-.004	-.034	-.002	-.032	.000	-.032	.000	-.033	.001	-.033	.001	-.034	.000	-.034	.000	-.016	.002	-.017	-.002	-.015	.001	-.016	.000
λ = .5																									
	2	-.159	-.023	-.159	-.020	-.155	-.009	-.153	-.004	-.182	-.030	-.176	-.003	-.174	.007	-.174	.002	-.108	-.004	-.105	-.001	-.107	-.002	-.106	-.001
	3	-.101	-.010	-.102	-.007	-.100	-.004	-.098	-.001	-.114	.003	-.112	.001	-.112	-.001	-.112	-.001	-.053	-.004	-.050	.001	-.051	-.002	-.050	.000
	4	-.073	-.004	-.071	.000	-.072	-.001	-.072	-.001	-.082	-.002	-.081	.000	-.080	.000	-.080	.000	-.045	-.002	-.043	.000	-.043	-.001	-.043	-.001
	5	-.057	-.002	-.055	-.001	-.056	-.001	-.055	.000	-.062	-.002	-.062	-.002	-.061	-.001	-.061	.000	-.033	-.003	-.029	.001	-.030	.000	-.029	.001
	6	-.045	-.002	-.045	-.003	-.045	-.001	-.044	.000	-.054	-.005	-.048	.000	-.048	.000	-.049	.000	-.028	-.002	-.026	-.001	-.027	-.002	-.025	-.001
	7	-.039	-.002	-.041	-.004	-.038	-.001	-.037	.000	-.044	-.004	-.043	-.001	-.043	-.001	-.041	.001	-.022	-.002	-.021	-.002	-.020	-.001	-.018	.001
λ = .6																									
	2	-.179	-.030	-.176	-.016	-.173	-.008	-.170	-.003	-.220	-.050	-.214	-.017	-.216	.003	-.214	.005	-.124	-.008	-.124	-.005	-.124	-.003	-.121	.001
	3	-.112	-.010	-.110	-.007	-.107	.000	-.107	-.001	-.139	.006	-.141	-.002	-.138	.000	-.138	-.001	-.057	.001	-.060	-.003	-.060	-.002	-.059	-.001
	4	-.082	-.008	-.081	-.006	-.078	-.001	-.079	-.001	-.100	-.001	-.099	-.001	-.099	-.001	-.099	-.001	-.049	-.001	-.048	-.002	-.048	.000	-.049	-.001
	5	-.059	-.003	-.062	-.003	-.060	-.001	-.062	-.003	-.077	-.002	-.074	.000	-.074	.001	-.074	.000	-.038	-.004	-.036	-.002	-.035	.000	-.034	.000
	6	-.050	-.005	-.052	-.005	-.047	.000	-.049	-.002	-.062	-.005	-.061	-.003	-.061	-.002	-.060	-.001	-.029	-.002	-.029	-.002	-.030	-.002	-.029	-.001
	7	-.042	-.003	-.042	-.003	-.041	-.001	-.041	.000	-.053	-.004	-.053	-.004	-.053	-.002	-.051	.000	-.022	-.001	-.022	.000	-.022	.000	-.022	-.001
λ = .7																									
	2	-.182	-.033	-.187	-.015	-.183	-.005	-.181	-.001	-.274	-.089	-.273	-.051	-.270	-.006	-.268	.002	-.138	-.012	-.135	-.004	-.137	-.002	-.136	-.001
	3	-.115	-.010	-.114	-.006	-.115	-.002	-.113	.001	-.177	-.004	-.176	.002	-.177	-.001	-.175	.000	-.067	-.005	-.068	-.005	-.067	-.002	-.067	-.002
	4	-.085	-.010	-.081	-.003	-.081	.000	-.082	-.001	-.126	-.006	-.126	-.002	-.125	-.001	-.125	.000	-.053	-.003	-.055	-.003	-.054	-.002	-.054	-.001
	5	-.065	-.006	-.062	-.003	-.063	-.002	-.063	-.001	-.095	-.005	-.094	-.002	-.093	.000	-.095	-.001	-.041	-.004	-.040	-.003	-.039	-.002	-.039	-.001
	6	-.052	-.007	-.051	-.005	-.051	-.002	-.050	.000	-.077	-.007	-.075	-.004	-.075	-.002	-.075	-.001	-.033	-.004	-.033	-.003	-.032	-.002	-.032	-.001
	7	-.045	-.007	-.042	-.003	-.043	-.001	-.041	.000	-.065	-.005	-.066	-.005	-.065	-.002	-.065	-.001	-.028	-.006	-.025	-.003	-.025	-.001	-.024	-.001
ϕ = .3																									
	2	-.052	.019	-.043	-.004	-.047	-.014	-.037	-.002	.000	.088	-.001	.048	.008	.014	.011	.006	-.019	.021	-.014	.015	-.010	.008	-.009	.006
	3	-.025	.023	-.024	.015	-.024	.004	-.029	-.003	.011	.038	.010	.021	.005	.006	.010	.008	.003	.027	.001	.019	-.003	.005	-.001	.005
	4	-.021	.018	-.020	.010	-.017	.005	-.016	.004	-.005	.016	.002	.014	.002	.005	.003	.003	-.002	.023	-.006	.012	-.004	.007	-.008	.001
	5	-.019	.013	-.010	.014	-.013	.004	-.015	.000	-.005	.015	-.002	.011	.004	.008	.003	.004	-.013	.008	.000	.016	-.002	.008	-.004	.003
	6	-.012	.018	-.011	.010	-.009	.006	-.010	.003	.005	.023	.000	.013	-.001	.003	.000	.002	-.006	.016	-.003	.012	-.006	.002	-.006	-.001
	7	-.008	.020	-.008	.013	-.012	.002	-.007	.004	.000	.018	-.007	.005	.001	.005	.000	.002	-.008	.012	-.006	.008	-.004	.002	-.002	.003

		Mod. Asym.-Alt.								Symmetric							
		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600	
param.	cats	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS
λ = .3																	
	2	-.069	-.001	-.069	-.003	-.066	.001	-.067	-.001	-.064	-.001	-.061	.002	-.060	.003	-.062	.001
	3	-.030	.002	-.030	.002	-.032	.000	-.031	.001	-.037	-.002	-.033	.003	-.036	-.002	-.033	.001
	4	-.029	-.001	-.028	.001	-.028	-.001	-.027	.000	-.026	-.004	-.022	.000	-.020	.001	-.020	.000
	5	-.021	-.001	-.020	.001	-.019	.001	-.020	-.001	-.016	-.001	-.015	.000	-.014	.000	-.014	.000
	6	-.017	-.002	-.020	.001	-.015	.001	-.015	.000	-.010	.000	-.009	.002	-.010	-.001	-.011	-.001
	7	-.015	-.003	-.015	-.003	-.011	.001	-.014	-.002	-.007	.001	-.008	.000	-.007	.000	-.007	.001
λ = .4																	
	2	-.089	-.002	-.089	-.002	-.090	-.003	-.087	.001	-.085	-.005	-.086	-.005	-.080	.001	-.082	.000
	3	-.043	-.002	-.043	-.002	-.042	-.001	-.041	-.001	-.048	-.001	-.046	.000	-.045	.001	-.045	.001
	4	-.038	.000	-.037	-.001	-.038	-.002	-.036	.001	-.028	.000	-.029	-.001	-.026	.001	-.028	.000
	5	-.027	.000	-.027	-.001	-.026	-.001	-.025	.000	-.021	-.001	-.022	-.003	-.019	-.001	-.019	-.001
	6	-.020	.002	-.027	-.001	-.020	.001	-.020	.001	-.013	.001	-.013	-.001	-.015	-.002	-.014	-.001
	7	-.018	-.001	-.017	-.001	-.017	-.001	-.016	.000	-.012	-.001	-.011	-.001	-.012	-.002	-.010	-.001
λ = .5																	
	2	-.113	-.006	-.111	-.003	-.108	.000	-.108	.000	-.105	-.009	-.099	.000	-.100	-.001	-.100	.000
	3	-.050	.001	-.050	.000	-.050	.000	-.051	-.001	-.058	-.001	-.056	.002	-.055	.001	-.057	.000
	4	-.050	-.005	-.048	-.003	-.046	.000	-.044	.001	-.036	-.002	-.036	-.002	-.034	.001	-.035	-.001
	5	-.036	-.004	-.035	-.003	-.033	.000	-.031	.001	-.025	-.002	-.023	.000	-.024	-.001	-.023	-.001
	6	-.025	.001	-.035	-.003	-.026	.001	-.027	-.001	-.019	-.002	-.017	-.001	-.017	.000	-.016	-.001
	7	-.021	-.001	-.019	.001	-.020	-.001	-.020	.000	-.017	-.004	-.014	-.001	-.012	.000	-.013	-.001
λ = .6																	
	2	-.128	-.001	-.130	-.004	-.129	.000	-.130	-.002	-.118	-.007	-.116	-.004	-.116	-.002	-.114	.001
	3	-.059	-.001	-.058	.000	-.059	-.001	-.058	.000	-.070	-.003	-.069	-.001	-.068	.000	-.067	.000
	4	-.054	.000	-.054	.001	-.056	-.002	-.055	-.001	-.043	-.002	-.043	-.002	-.041	.000	-.040	.000
	5	-.037	.002	-.038	.000	-.038	.000	-.039	-.001	-.028	-.002	-.027	.000	-.028	-.001	-.028	-.001
	6	-.029	-.002	-.038	.000	-.031	.000	-.030	.002	-.022	-.004	-.020	-.001	-.020	-.002	-.020	-.001
	7	-.026	-.003	-.025	-.002	-.025	-.001	-.024	-.001	-.017	-.004	-.015	-.001	-.014	.001	-.015	-.001
λ = .7																	
	2	-.150	-.007	-.153	-.008	-.150	-.001	-.150	.000	-.130	-.009	-.130	-.004	-.133	-.005	-.131	-.002
	3	-.068	-.004	-.068	-.003	-.068	-.001	-.068	-.001	-.081	-.006	-.079	-.003	-.078	-.001	-.078	.000
	4	-.068	-.003	-.066	.000	-.068	-.001	-.067	.000	-.047	-.003	-.049	-.003	-.046	.000	-.046	.001
	5	-.049	-.004	-.048	-.003	-.048	-.002	-.048	-.002	-.031	-.003	-.033	-.003	-.031	.000	-.031	.000
	6	-.041	-.003	-.048	-.003	-.040	-.001	-.039	-.001	-.023	-.004	-.024	-.003	-.023	-.002	-.022	-.001
	7	-.030	-.003	-.029	-.001	-.029	-.001	-.029	-.001	-.017	-.004	-.017	-.003	-.016	.000	-.017	-.001
ϕ = .3																	
	2	-.010	.026	-.004	.021	-.005	.006	-.003	.004	-.011	.028	-.012	.015	-.009	.005	-.006	.005
	3	-.004	.020	.000	.015	-.004	.004	-.002	.003	-.008	.013	-.006	.010	-.001	.006	.001	.005
	4	-.004	.007	-.008	.001	.000	.020	-.002	.009	.003	.008	.001	.003	-.008	.012	-.006	.007	-.001	.004	.002	.005
	5	-.002	.008	-.004	.003	.000	.019	-.001	.010	.003	.008	.002	.004	-.002	.016	.003	.015	-.002	.003	.001	.004
	6	-.006	.002	-.006	-.001	-.006	.010	-.001	.010	.000	.004	-.005	-.002	-.008	.010	.000	.011	-.001	.003	-.003	.000
	7	-.004	.002	-.002	.003	.003	.020	-.001	.009	.003	.008	.000	.002	.002	.018	-.005	.006	.000	.005	.004	.007

Note. Mod. Asym = Moderate Asymmetry; Mod. Asym-Alt = Moderate Asymmetry-Alternating; Ext. Asym = Exteme Asymmetry; Ext. Asym-Alt = Extreme Asymmetry-Alternating. ML = robust normal-theory maximum likelihood; ULS = robust categorical least squares.

Parameter Bias (bias = $\bar{\theta} - \theta$), Model 2, Underlying Distribution = Skew 2, Kurtosis 7

		Ext. Asym.								Ext. Asym.								Mod. Asym.								Mod. Asym.-Alt.								Symmetric							
		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600	
param.	cats	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS
λ = .3																																									
	2	-.107	-.004	-.099	-.002	-.105	.010	-.128	.018	-.143	-.081	-.136	-.015	-.126	.029	-.122	.036	-.064	.013	-.061	.020	-.062	.020	-.059	.026	-.052	.024	-.051	.024	-.050	.025	-.051	.024	-.046	.025	-.046	.025	-.047	.023	-.047	.024
	3	-.071	.001	-.070	.011	-.071	.015	-.067	.021	-.057	.022	-.057	.021	-.053	.026	-.054	.024	-.011	.025	-.010	.025	-.012	.023	-.011	.024	-.009	.027	-.012	.024	-.013	.023	-.012	.024	-.024	.025	-.023	.025	-.024	.024	-.023	.025
	4	-.054	.012	-.054	.013	-.048	.023	-.048	.023	-.031	.024	-.030	.026	-.030	.026	-.031	.023	-.014	.025	-.015	.023	-.014	.025	-.015	.024	-.009	.027	-.012	.025	-.013	.024	-.013	.024	-.023	.026	-.022	.025	-.023	.024	-.022	.024
	5	-.038	.019	-.038	.020	-.038	.020	-.036	.022	-.020	.022	-.017	.026	-.019	.023	-.017	.025	-.010	.023	-.008	.024	-.007	.024	-.008	.023	-.006	.024	-.004	.026	-.005	.024	-.003	.026	-.006	.022	-.005	.024	-.004	.025	-.003	.025
	6	-.028	.020	-.027	.021	-.025	.024	-.026	.023	-.013	.023	-.013	.023	-.010	.024	-.010	.025	-.026	.022	-.024	.022	-.019	.026	-.020	.025	-.008	.024	-.007	.026	-.005	.026	-.007	.024	-.004	.021	.000	.024	-.001	.023	.001	.024
	7	-.022	.021	-.020	.023	-.018	.026	-.020	.023	-.004	.026	-.006	.024	-.006	.025	-.006	.024	-.011	.027	-.012	.025	-.011	.024	-.011	.024	-.002	.023	.000	.025	-.001	.024	.000	.025	-.002	.023	-.001	.023	.003	.026	.000	.023
λ = .4																																									
	2	-.131	-.001	-.128	-.001	-.131	.018	-.166	.022	-.192	-.151	-.180	-.055	-.169	.017	-.165	.036	-.081	.021	-.078	.027	-.079	.026	-.078	.028	-.066	.032	-.069	.029	-.068	.029	-.070	.028	-.066	.023	-.062	.029	-.061	.030	-.063	.028
	3	-.089	.010	-.086	.016	-.085	.023	-.085	.025	-.076	.035	-.074	.033	-.074	.030	-.074	.030	-.019	.027	-.019	.027	-.018	.028	-.017	.029	-.019	.028	-.017	.030	-.018	.028	-.018	.028	-.039	.025	-.036	.028	-.034	.030	-.034	.028
	4	-.064	.019	-.064	.021	-.060	.027	-.061	.026	-.044	.031	-.045	.028	-.045	.028	-.044	.028	-.022	.026	-.022	.026	-.020	.027	-.020	.029	-.019	.029	-.022	.027	-.020	.028	-.019	.028	-.035	.026	-.030	.029	-.030	.030	-.030	.030
	5	-.046	.023	-.046	.024	-.043	.029	-.042	.030	-.027	.029	-.029	.026	-.026	.029	-.028	.028	-.014	.025	-.013	.027	-.010	.029	-.010	.029	-.009	.030	-.008	.030	-.009	.029	-.009	.028	-.007	.032	-.007	.030	-.008	.029	-.008	.028
	6	-.033	.025	-.032	.027	-.032	.028	-.032	.027	-.018	.029	-.019	.026	-.016	.029	-.017	.028	-.029	.029	-.029	.026	-.026	.029	-.026	.029	-.014	.030	-.010	.031	-.013	.028	-.012	.029	-.002	.029	-.003	.029	.000	.030	.000	.029
	7	-.029	.023	-.027	.025	-.025	.028	-.026	.027	-.010	.029	-.010	.029	-.010	.029	-.009	.030	-.013	.031	-.013	.030	-.013	.029	-.014	.028	-.006	.026	-.004	.029	-.003	.029	-.003	.029	-.002	.029	-.003	.028	-.002	.028	-.002	.028
λ = .5																																									
	2	-.143	.009	-.144	.009	-.155	.021	-.198	.026	-.237	-.223	-.225	-.098	-.213	-.003	-.210	.026	-.097	.024	-.098	.023	-.098	.027	-.096	.029	-.092	.027	-.091	.028	-.089	.031	-.088	.031	-.078	.030	-.084	.023	-.080	.029	-.079	.030
	3	-.100	.017	-.098	.021	-.096	.028	-.098	.027	-.104	.035	-.100	.035	-.100	.031	-.099	.032	-.025	.030	-.026	.028	-.025	.030	-.024	.031	-.025	.033	-.027	.032	-.027	.030	-.028	.030	-.049	.030	-.049	.029	-.047	.032	-.047	.030
	4	-.073	.023	-.073	.025	-.071	.027	-.068	.031	-.062	.029	-.061	.031	-.060	.030	-.059	.032	-.029	.025	-.027	.029	-.025	.030	-.024	.031	-.028	.032	-.028	.031	-.028	.031	-.027	.031	-.044	.028	-.040	.031	-.038	.032	-.039	.031
	5	-.055	.024	-.053	.027	-.052	.028	-.051	.030	-.040	.030	-.039	.030	-.038	.031	-.038	.031	-.018	.028	-.015	.032	-.015	.030	-.014	.031	-.017	.029	-.014	.032	-.014	.032	-.014	.032	-.015	.029	-.014	.029	-.011	.032	-.012	.030
	6	-.040	.026	-.038	.027	-.036	.031	-.036	.031	-.024	.031	-.026	.029	-.024	.031	-.024	.031	-.038	.026	-.034	.029	-.031	.031	-.032	.030	-.021	.029	-.018	.032	-.019	.030	-.019	.031	-.007	.028	-.007	.029	-.006	.030	-.005	.031
	7	-.029	.028	-.030	.028	-.028	.029	-.029	.030	-.020	.028	-.019	.029	-.017	.031	-.019	.029	-.019	.030	-.017	.031	-.017	.031	-.017	.029	-.008	.030	-.008	.030	-.005	.032	-.007	.029	-.007	.029	-.005	.029	-.004	.031	-.003	.032
λ = .6																																									
	2	-.162	.002	-.160	.013	-.174	.023	-.227	.028	-.290	-.302	-.271	-.150	-.262	-.032	-.262	-.002	-.114	.020	-.112	.025	-.113	.027	-.111	.030	-.110	.028	-.111	.028	-.110	.030	-.111	.029	-.092	.028	-.096	.025	-.095	.029	-.094	.031
	3	-.111	.013	-.111	.020	-.107	.027	-.106	.029	-.135	.040	-.130	.037	-.132	.031	-.129	.033	-.033	.029	-.035	.028	-.033	.031	-.034	.030	-.042	.025	-.037	.030	-.038	.030	-.036	.031	-.064	.029	-.064	.029	-.062	.030	-.061	.031
	4	-.079	.023	-.078	.027	-.078	.028	-.077	.030	-.081	.029	-.081	.032	-.080	.031	-.081	.031	-.035	.024	-.033	.027	-.030	.030	-.031	.030	-.043	.026	-.041	.028	-.039	.030	-.039	.030	-.048	.032	-.048	.031	-.049	.030	-.047	.031
	5	-.060	.022	-.056	.027	-.056	.030	-.056	.030	-.052	.031	-.054	.028	-.053	.030	-.053	.031	-.021	.030	-.024	.027	-.020	.030	-.021	.030	-.022	.030	-.023	.032	-.024	.030	-.022	.032	-.021	.027	-.016	.032	-.019	.028	-.017	.031
	6	-.045	.023	-.041	.027	-.039	.030	-.040	.030	-.037	.028	-.037	.028	-.035	.030	-.036	.030	-.040	.028	-.036	.031	-.038	.030	-.036	.031	-.032	.025	-.027	.031	-.025	.032	-.026	.031	-.012	.029	-.010	.031	-.010	.031	-.010	.031
	7	-.031	.028	-.034	.027	-.033	.027	-.031	.030	-.025	.030	-.029	.028	-.027	.030	-.026	.031	-.023	.027	-.020	.031	-.020	.031	-.020	.031	-.014	.027	-.013	.030	-.013	.030	-.012	.031	-.011	.027	-.009	.029	-.008	.031	-.008	.030
λ = .7																																									
	2	-.169	-.007	-.175	.002	-.187	.025	-.257	.027	-.345	-.379	-.335	-.214	-.327	-.082	-.327	-.038	-.125	.018	-.127	.020	-.125	.027	-.124	.030	-.135	.020	-.135	.024	-.134	.028	-.135	.028	-.110	.019	-.111	.021	-.109	.027	-.109	.028
	3	-.117	.012	-.111	.025	-.113	.028	-.113	.028	-.176	.032	-.172	.033	-.173	.031	-.173	.030	-.043	.027	-.043	.028	-.043	.029	-.043	.029	-.050	.026	-.049	.028	-.049	.028	-.048	.030	-.077	.027	-.079	.026	-.077	.028	-.076	.031
	4	-.084	.018	-.085	.020	-.084	.026	-.081	.028	-.112	.025	-.110	.027	-.109	.030	-.110	.029	-.036	.026	-.034	.029	-.035	.029	-.034	.030	-.054	.026	-.052	.028	-.052	.030	-.052	.030	-.059	.025	-.058	.028	-.056	.030	-.057	.030
	5	-.061	.021	-.059	.024	-.059	.028	-.059	.029	-.074	.024	-.073	.028	-.074	.029	-.073	.030	-.029	.026	-.027	.027	-.026	.030	-.028	.029	-.033	.028	-.033	.028	-.033	.029	-.033	.030	-.026	.026	-.024	.029	-.024	.029	-.024	.030
	6	-.046	.021	-.042	.027	-.041	.030	-.043	.029	-.052	.024	-.052	.027	-.051	.029	-.052	.029	-.042	.025	-.042	.027	-.040	.030	-.040	.030	-.039	.026	-.037	.029	-.038	.029	-.038	.029	-.018	.025	-.015	.029	-.016	.029	-.015	.030
	7	-.034	.023	-.034	.026	-.034	.028	-.033	.030	-.039	.027	-.041	.026	-.039	.030	-.041	.029	-.025	.025	-.021	.029	-.021	.031	-.023	.029	-.022	.026	-.018	.029	-.018	.030	-.020	.029	-.014	.027	-.013	.028	-.012	.029	-.012	.030
ϕ = .3																																									
	2	-.044	.058	-.041	.009	-.035	.005	-.037	.005	-.038	.409	-.029	.240	.002	.103	.011	.062	-.018	.023	-.008	.030	-.011	.016	-.009	.014	.006	.038	.007	.031	.004	.015	.009	.017	.001	.041	-.005	.023	.003	.020	.000	.014
	3	-.027	.020	-.035	.007	-.027	.010	-.027	.009	.028	.046	.022	.029	.016	.014	.019	.014	.006	.027	.011	.026	.012	.020	.010	.016	.014	.032	.011	.024	.008	.013	.010	.014	.011	.032	.008	.023	.009	.015	.015	.018
	4	-.019	.030	-.030	.010	-.013	.021	-.014	.017	.013	.030	.015	.024	.018	.019	.016	.015	-.001	.028	-.004	.019	-.002	.014	.003	.017	.011	.029	.009	.023	.012	.018	.013	.017	.001	.032	.002	.025	-.001	.014	.004	.016
	5	-.021	.023	-.014	.022	-.011	.018	-.011	.014	.014	.034	.015	.027	.012	.015	.014	.016	.000	.026	.002	.020	.006	.016	.007	.016	.007	.029	.012	.025	.009	.016	.014	.018	.005	.028	.000	.017	.005	.014	.008	.015
	6	-.012	.027	-.007	.026	-.006	.018	-.007	.014	.003	.021	.014	.027	.011	.017	.012	.014	-.007	.030	-.009	.022	-.002	.019	-.003	.014	.003	.025	.009	.022	.008	.016	.010	.016	.011	.032	.004	.019	.007	.015	.008	.014
	7	-.007	.029	-.013	.017	-.011	.012	-.005	.015	.007	.026	.013	.025	.011	.016	.011	.014	-.008	.025	-.004	.021	-.003	.016	-.004	.012	.005	.025	.010	.025	.009	.017	.007	.012	.001	.024	.006	.022	.007	.017	.007	.015

Note. Mod. Asym = Moderate Asymmetry; Mod. Asym-Alt = Moderate Asymmetry-Alternating; Ext. Asym = Exteme Asymmetry; Ext. Asym-Alt = Extreme Asymmetry-Alternating. ML = robust normal-theory maximum likelihood; ULS = robust categorical least squares.

Efficiency = $\sum_{1}^{Nreps}\left(\theta_i-\bar{\theta}\right)^2\Big/N-1$, Model 1, Underlying Distribution = Normal

		Ext. Asym.								Ext. Asym.-Alt.								Mod. Asym.							
		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600	
param.	cats	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS
λ = .3																									
	2	.203	.287	.147	.218	.093	.133	.071	.101	.196	.260	.169	.210	.094	.133	.070	.098	.146	.189	.122	.151	.075	.095	.057	.073
	3	.155	.198	.120	.148	.080	.097	.060	.075	.151	.190	.121	.149	.074	.091	.057	.070	.125	.140	.102	.116	.067	.075	.052	.059
	4	.143	.163	.113	.131	.074	.083	.056	.065	.138	.159	.111	.127	.073	.084	.052	.061	.126	.138	.103	.114	.068	.074	.051	.056
	5	.135	.147	.108	.121	.070	.077	.053	.059	.133	.147	.107	.118	.068	.077	.051	.057	.124	.133	.100	.108	.066	.070	.050	.053
	6	.131	.140	.104	.113	.068	.073	.052	.057	.131	.142	.104	.113	.066	.072	.052	.056	.123	.129	.099	.105	.065	.068	.049	.052
	7	.128	.135	.103	.110	.068	.072	.052	.056	.133	.141	.103	.110	.064	.069	.051	.054	.120	.123	.097	.101	.065	.067	.049	.051
λ = .4																									
	2	.229	.283	.165	.223	.097	.131	.071	.095	.184	.244	.148	.195	.087	.135	.065	.104	.153	.187	.122	.149	.074	.093	.057	.072
	3	.169	.189	.130	.150	.080	.094	.060	.071	.154	.190	.116	.153	.072	.093	.054	.071	.125	.137	.102	.114	.064	.072	.048	.055
	4	.146	.159	.115	.126	.072	.081	.054	.061	.136	.156	.105	.125	.067	.080	.051	.061	.127	.136	.101	.108	.065	.071	.048	.054
	5	.135	.144	.109	.117	.069	.075	.051	.056	.124	.141	.102	.116	.065	.074	.050	.057	.121	.127	.098	.104	.063	.066	.047	.051
	6	.135	.134	.105	.109	.067	.071	.050	.053	.125	.137	.097	.108	.064	.071	.049	.055	.121	.123	.096	.100	.063	.065	.046	.048
	7	.126	.129	.102	.104	.065	.068	.049	.051	.121	.132	.095	.104	.061	.067	.047	.052	.118	.122	.096	.098	.060	.062	.045	.048
λ = .5																									
	2	.301	.255	.192	.206	.122	.130	.077	.098	.254	.234	.174	.200	.098	.132	.073	.106	.199	.179	.123	.146	.078	.095	.057	.070
	3	.180	.182	.136	.149	.082	.094	.061	.070	.161	.183	.133	.147	.077	.093	.058	.071	.126	.135	.099	.110	.062	.071	.048	.054
	4	.152	.150	.115	.124	.073	.079	.055	.060	.159	.153	.109	.120	.070	.080	.052	.059	.126	.132	.100	.107	.063	.069	.048	.052
	5	.138	.137	.107	.113	.068	.072	.051	.055	.127	.137	.103	.112	.068	.075	.050	.056	.121	.125	.095	.100	.060	.063	.046	.049
	6	.131	.131	.102	.106	.065	.069	.049	.052	.124	.130	.099	.107	.063	.068	.047	.052	.117	.118	.095	.099	.059	.062	.045	.047
	7	.125	.126	.101	.103	.063	.066	.048	.050	.127	.132	.091	.098	.061	.065	.046	.050	.115	.117	.093	.095	.058	.061	.044	.046
λ = .6																									
	2	.304	.229	.224	.199	.114	.131	.082	.100	.249	.209	.177	.182	.098	.141	.067	.114	.192	.169	.132	.142	.080	.095	.060	.071
	3	.230	.179	.143	.145	.084	.092	.064	.071	.163	.177	.133	.148	.072	.099	.054	.074	.159	.131	.100	.107	.061	.068	.048	.054
	4	.174	.149	.119	.121	.073	.079	.057	.061	.141	.151	.111	.127	.066	.081	.049	.061	.179	.126	.102	.105	.061	.066	.049	.052
	5	.144	.137	.108	.110	.068	.071	.052	.055	.138	.141	.102	.114	.062	.072	.046	.055	.121	.118	.093	.097	.061	.063	.046	.049
	6	.144	.127	.103	.103	.063	.066	.050	.052	.130	.134	.094	.104	.060	.067	.045	.052	.120	.117	.092	.094	.059	.061	.045	.047
	7	.128	.124	.101	.101	.062	.064	.049	.050	.124	.126	.095	.101	.057	.064	.044	.050	.129	.113	.091	.092	.057	.059	.044	.045
λ = .7																									
	2	.398	.219	.255	.188	.126	.131	.088	.102	.269	.209	.212	.180	.119	.138	.082	.113	.244	.164	.145	.144	.084	.098	.060	.071
	3	.320	.170	.159	.142	.086	.092	.065	.072	.255	.173	.175	.149	.083	.101	.061	.076	.158	.129	.109	.111	.063	.070	.048	.054
	4	.259	.142	.181	.123	.075	.080	.056	.059	.179	.145	.127	.122	.073	.084	.054	.063	.146	.124	.105	.105	.064	.069	.048	.052
	5	.170	.131	.116	.112	.069	.072	.051	.054	.154	.136	.115	.112	.065	.073	.051	.057	.132	.118	.099	.101	.061	.064	.046	.048
	6	.169	.122	.115	.108	.065	.068	.049	.050	.148	.128	.103	.105	.061	.067	.047	.052	.128	.113	.095	.095	.059	.061	.045	.046
	7	.143	.119	.107	.101	.063	.065	.048	.049	.174	.123	.100	.100	.061	.065	.045	.049	.122	.110	.095	.094	.057	.059	.043	.044
ϕ = .3																									
	2	.374	.378	.232	.298	.141	.155	.102	.110	.365	.321	.301	.252	.148	.139	.111	.106	.279	.215	.167	.173	.105	.109	.079	.082
	3	.280	.249	.171	.185	.106	.112	.080	.083	.230	.226	.176	.170	.106	.104	.081	.077	.169	.171	.133	.136	.087	.088	.065	.066
	4	.187	.198	.149	.154	.096	.099	.073	.075	.203	.197	.158	.151	.096	.094	.070	.069	.169	.172	.132	.134	.087	.087	.064	.065
	5	.179	.181	.139	.142	.091	.091	.068	.069	.184	.181	.147	.145	.088	.086	.069	.068	.162	.165	.128	.130	.082	.083	.061	.062
	6	.171	.171	.132	.134	.086	.087	.065	.065	.174	.173	.137	.135	.088	.087	.067	.066	.161	.160	.125	.125	.082	.081	.061	.061
	7	.165	.168	.131	.132	.085	.084	.064	.064	.167	.168	.135	.132	.085	.085	.064	.064	.154	.155	.123	.123	.080	.080	.059	.060

		Mod. Asym.-Alt.								Symmetric							
		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600	
param.	cats	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS
λ = .3																	
	2	.149	.186	.122	.151	.075	.095	.055	.071	.144	.179	.116	.145	.071	.090	.056	.071
	3	.126	.141	.101	.114	.066	.074	.051	.057	.131	.150	.104	.119	.068	.078	.051	.059
	4	.127	.140	.102	.113	.067	.074	.050	.056	.126	.137	.100	.110	.066	.071	.049	.054
	5	.123	.133	.101	.109	.065	.070	.048	.051	.126	.134	.097	.105	.064	.068	.049	.052
	6	.121	.128	.097	.101	.064	.068	.047	.050	.121	.128	.097	.103	.063	.067	.047	.050
	7	.123	.128	.098	.101	.063	.067	.047	.049	.121	.127	.095	.100	.064	.067	.048	.051
λ = .4																	
	2	.147	.183	.116	.145	.073	.094	.055	.071	.145	.170	.113	.136	.072	.090	.055	.068
	3	.125	.138	.099	.112	.065	.073	.049	.056	.134	.147	.102	.115	.065	.073	.048	.055
	4	.122	.136	.100	.111	.063	.071	.048	.054	.122	.130	.097	.105	.061	.067	.046	.051
	5	.118	.128	.094	.102	.061	.066	.047	.051	.120	.127	.097	.102	.060	.064	.045	.049
	6	.121	.129	.095	.101	.062	.067	.046	.049	.118	.124	.093	.097	.060	.063	.044	.047
	7	.119	.124	.096	. 100	.061	.064	.045	.048	.117	.122	.092	.097	.059	.062	.043	.046
λ = .5																	
	2	.194	.179	.127	.142	.075	.093	.056	.071	.155	.171	.116	.138	.074	.090	.056	.068
	3	.125	.136	.097	.109	.062	.070	.048	.054	.130	.142	.101	.112	.063	.072	.048	.056
	4	.123	.130	.098	.107	.062	.070	.046	.052	.121	.129	.094	.102	.060	.066	.045	.049
	5	.120	.124	.093	.101	.060	.065	.045	.049	.118	.124	.092	.098	.058	.062	.043	.046
	6	.117	.119	.092	.096	.059	.063	.045	.048	.115	.121	.090	.095	.056	.060	.044	.046
	7	.116	.115	.090	.094	.058	.061	.044	.047	.112	.117	.089	.094	.057	.060	.043	.045
λ = .6																	
	2	.191	.172	.137	.144	.075	.093	.057	.073	.186	.164	.125	.135	.074	.089	.057	.068
	3	.129	.131	.100	.109	.063	.070	.048	.054	.131	.136	.100	.109	.064	.072	.048	.055
	4	.121	.126	.099	.108	.059	.068	.045	.051	.122	.125	.092	.099	.060	.065	.045	.049
	5	.116	.117	.091	.097	.057	.063	.043	.047	.117	.118	.091	.096	.057	.061	.044	.047
	6	.117	.118	.091	.097	.056	.060	.042	.046	.112	.114	.086	.091	.055	.059	.043	.046
	7	.122	.113	.087	.090	.056	.059	.042	.044	.113	.113	.086	.090	.055	.059	.042	.045
λ = .7																	
	2	.260	.168	.147	.139	.081	.096	.059	.073	.198	.159	.147	.139	.082	.095	.058	.070
	3	.146	.128	.102	.106	.063	.070	.047	.052	.138	.135	.108	.112	.065	.074	.051	.058
	4	.179	.127	.102	.104	.062	.069	.046	.052	.145	.124	.097	.102	.060	.066	.045	.049
	5	.125	.116	.093	.096	.058	.062	.043	.048	.128	.116	.095	.096	.057	.061	.043	.046
	6	.126	.113	.093	.095	.058	.061	.044	.047	.117	.112	.089	.092	.055	.059	.043	.045
	7	.132	.113	.090	.090	.057	.059	.042	.044	.118	.112	.090	.092	.055	.058	.042	.044
ϕ = .3																	
	2	.225	.233	.167	.169	.104	.104	.080	.080	.206	.212	.163	.165	.097	.099	.075	.077
	3	.176	.179	.138	.142	.084	.085	.065	.066	.171	.179	.140	.143	.090	.091	.066	.067
	4	.171	.167	.131	.133	.086	.087	.064	.064	.161	.163	.129	.131	.082	.083	.061	.062
	5	.160	.161	.130	.131	.083	.084	.060	.060	.155	.157	.122	.124	.080	.082	.060	.061
	6	.155	.157	.127	.126	.081	.080	.060	.060	.149	.153	.122	.123	.079	.080	.059	.060
	7	.156	.155	.122	.122	.081	.081	.060	.060	.149	.151	.120	.121	.077	.079	.059	.060

Note. Mod. Asym = Moderate Asymmetry; Mod. Asym-Alt = Moderate Asymmetry-Alternating; Ext. Asym = Exteme Asymmetry; Ext. Asym-Alt = Extreme Asymmetry-Alternating. ML = robust normal-theory maximum likelihood; ULS = robust categorical least squares.

Efficiency = $\sum_{1}^{Nreps}\left(\theta_i-\bar{\theta}\right)^2\Big/N-1$, Model 1, Underlying Distribution = Skew 2, Kurtosis 7

		Ext. Asym.								Ext. Asym.-Alt.								Mod. Asym.							
		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600	
param.	cats	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS
λ = .3																									
	2	.202	.267	.206	.236	.098	.143	.073	.107	.320	.315	.286	.252	.169	.164	.132	.135	.153	.203	.123	.161	.078	.102	.059	.077
	3	.166	.220	.135	.175	.085	.108	.064	.082	.151	.193	.120	.152	.075	.094	.058	.073	.121	.137	.099	.112	.064	.072	.049	.056
	4	.152	.185	.122	.146	.078	.092	.059	.071	.136	.158	.110	.129	.067	.079	.052	.061	.130	.141	.105	.114	.066	.073	.052	.058
	5	.143	.162	.114	.128	.074	.082	.057	.064	.130	.145	.104	.117	.066	.074	.051	.056	.127	.131	.102	.105	.067	.070	.051	.053
	6	.138	.150	.110	.120	.071	.076	.055	.060	.121	.133	.105	.114	.067	.073	.049	.054	.138	.139	.110	.112	.071	.071	.055	.056
	7	.135	.141	.108	.112	.069	.072	.054	.057	.124	.132	.098	.105	.063	.069	.049	.052	.131	.129	.107	.108	.069	.069	.053	.054
λ = .4																									
	2	.237	.252	.174	.223	.100	.137	.073	.098	.297	.402	.233	.263	.174	.146	.134	.125	.159	.194	.123	.152	.077	.098	.057	.071
	3	.203	.208	.143	.164	.086	.104	.063	.076	.151	.196	.114	.155	.073	.097	.052	.071	.120	.134	.096	.107	.062	.071	.046	.052
	4	.161	.172	.123	.137	.078	.089	.057	.066	.126	.150	.102	.125	.065	.080	.049	.060	.132	.138	.102	.108	.067	.072	.049	.053
	5	.147	.154	.114	.121	.073	.080	.054	.058	.124	.142	.095	.109	.062	.073	.047	.055	.125	.125	.099	.101	.064	.067	.048	.050
	6	.141	.143	.109	.111	.071	.076	.051	.053	.118	.128	.093	.102	.061	.069	.046	.051	.139	.130	.109	.105	.070	.070	.052	.052
	7	.136	.136	.106	.106	.069	.071	.050	.052	.117	.126	.093	.102	.060	.065	.046	.051	.133	.126	.104	.100	.066	.066	.050	.048
λ = .5																									
	2	.292	.248	.207	.211	.109	.134	.076	.095	.361	.303	.332	.247	.234	.155	.198	.122	.173	.187	.125	.146	.079	.097	.057	.070
	3	.220	.200	.143	.160	.088	.100	.063	.072	.170	.185	.122	.144	.076	.093	.055	.068	.118	.127	.092	.104	.060	.068	.045	.051
	4	.174	.173	.125	.133	.079	.086	.057	.063	.134	.147	.106	.123	.066	.077	.049	.056	.131	.131	.100	.104	.064	.067	.047	.051
	5	.171	.149	.115	.121	.073	.077	.053	.056	.127	.136	.098	.108	.063	.069	.048	.053	.126	.119	.097	.095	.063	.064	.046	.048
	6	.145	.136	.106	.109	.069	.070	.050	.052	.117	.123	.094	.101	.061	.066	.045	.048	.145	.130	.111	.105	.070	.069	.051	.049
	7	.138	.128	.104	.103	.067	.067	.049	.050	.118	.120	.095	.100	.058	.062	.045	.048	.134	.120	.101	.096	.065	.063	.048	.047
λ = .6																									
	2	.273	.229	.269	.195	.113	.129	.083	.098	.324	.380	.260	.251	.240	.149	.163	.120	.227	.174	.140	.145	.079	.094	.059	.071
	3	.284	.178	.156	.153	.090	.098	.067	.074	.162	.182	.120	.148	.073	.100	.052	.074	.126	.129	.092	.101	.060	.067	.044	.050
	4	.185	.157	.132	.129	.078	.082	.058	.063	.139	.148	.099	.121	.063	.079	.047	.059	.133	.127	.098	.100	.063	.066	.048	.051
	5	.173	.141	.117	.115	.071	.073	.054	.056	.127	.133	.095	.108	.059	.069	.044	.053	.125	.117	.097	.094	.060	.061	.045	.045
	6	.152	.128	.109	.106	.067	.069	.050	.051	.114	.121	.094	.100	.056	.063	.044	.049	.144	.123	.111	.100	.068	.065	.051	.050
	7	.143	.121	.104	.100	.065	.065	.049	.049	.113	.117	.088	.095	.057	.063	.042	.047	.130	.116	.101	.095	.063	.061	.047	.046
λ = .7																									
	2	.413	.205	.309	.182	.132	.125	.089	.100	.453	.306	.377	.251	.305	.148	.248	.124	.250	.171	.158	.138	.082	.094	.064	.075
	3	.267	.177	.202	.144	.090	.094	.070	.075	.223	.166	.153	.139	.083	.099	.059	.075	.130	.125	.094	.100	.058	.065	.045	.050
	4	.212	.159	.146	.123	.078	.081	.062	.064	.158	.138	.110	.119	.068	.078	.051	.059	.139	.125	.100	.097	.062	.064	.048	.049
	5	.255	.139	.120	.112	.069	.071	.056	.056	.199	.129	.099	.105	.064	.072	.047	.053	.131	.114	.095	.091	.059	.059	.046	.045
	6	.165	.130	.111	.101	.064	.064	.053	.052	.121	.114	.096	.097	.060	.065	.044	.047	.153	.119	.111	.098	.066	.062	.053	.049
	7	.149	.124	.106	.096	.063	.061	.050	.049	.161	.113	.094	.092	.057	.060	.043	.046	.139	.116	.101	.090	.062	.059	.049	.045
ϕ = .3																									
	2	.373	.319	.240	.297	.136	.157	.099	.110	.715	.630	.440	.345	.230	.191	.209	.136	.215	.245	.170	.182	.102	.107	.077	.080
	3	.321	.259	.184	.203	.106	.113	.081	.087	.215	.216	.176	.166	.100	.096	.079	.077	.162	.164	.132	.132	.082	.083	.059	.060
	4	.204	.219	.166	.172	.097	.100	.073	.075	.187	.187	.146	.147	.088	.088	.070	.069	.174	.171	.138	.136	.085	.085	.061	.061
	5	.194	.197	.151	.151	.090	.091	.067	.068	.173	.176	.137	.137	.083	.084	.066	.065	.162	.154	.135	.128	.081	.079	.061	.059
	6	.183	.182	.144	.139	.086	.087	.065	.064	.163	.161	.129	.128	.082	.081	.061	.061	.179	.169	.146	.132	.087	.083	.065	.060
	7	.177	.169	.141	.135	.085	.083	.064	.061	.155	.152	.130	.129	.078	.077	.064	.063	.171	.159	.138	.127	.082	.078	.062	.058

		Mod. Asym.-Alt.								Symmetric							
		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600	
param.	cats	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS
λ = .3																	
	2	.146	.186	.113	.145	.071	.092	.054	.070	.141	.179	.110	.140	.069	.088	.055	.069
	3	.122	.139	.101	.117	.065	.074	.048	.055	.130	.155	.102	.120	.066	.080	.051	.061
	4	.123	.138	.100	.110	.066	.074	.049	.056	.135	.155	.105	.120	.067	.076	.053	.060
	5	.121	.130	.101	.109	.063	.068	.049	.053	.127	.137	.099	.107	.064	.070	.050	.054
	6	.125	.135	.104	.110	.067	.070	.051	.054	.125	.130	.097	.101	.063	.067	.049	.052
	7	.122	.126	.101	.104	.064	.069	.049	.051	.125	.126	.100	.103	.064	.066	.050	.051
λ = .4																	
	2	.143	.180	.110	.142	.071	.092	.054	.071	.142	.168	.110	.133	.071	.090	.051	.064
	3	.120	.136	.097	.108	.062	.071	.048	.054	.125	.146	.098	.115	.065	.077	.049	.058
	4	.120	.134	.097	.108	.062	.071	.047	.053	.131	.145	.105	.115	.068	.076	.048	.054
	5	.121	.129	.098	.105	.060	.065	.047	.052	.118	.127	.096	.102	.062	.067	.046	.049
	6	.121	.126	.096	.101	.062	.065	.047	.051	.116	.120	.094	.096	.063	.066	.045	.048
	7	.123	.124	.092	.096	.061	.063	.046	.048	.118	.120	.095	.095	.062	.063	.046	.048
λ = .5																	
	2	.152	.168	.117	.142	.072	.090	.054	.068	.159	.164	.112	.136	.070	.085	.053	.064
	3	.114	.127	.095	.107	.058	.067	.045	.051	.126	.144	.100	.117	.064	.075	.046	.055
	4	.119	.127	.095	.105	.062	.069	.045	.051	.134	.145	.104	.115	.066	.073	.049	.054
	5	.117	.124	.094	.099	.059	.062	.045	.049	.117	.121	.092	.097	.060	.064	.044	.048
	6	.122	.123	.100	.101	.060	.063	.047	.048	.116	.117	.092	.096	.059	.061	.043	.045
	7	.119	.120	.094	.095	.059	.061	.045	.047	.116	.112	.091	.090	.060	.061	.044	.045
λ = .6																	
	2	.168	.169	.115	.138	.070	.090	.053	.069	.160	.157	.114	.130	.072	.087	.053	.065
	3	.122	.126	.093	.104	.058	.065	.044	.051	.130	.138	.099	.111	.063	.073	.047	.055
	4	.115	.123	.090	.101	.058	.066	.042	.047	.137	.134	.104	.110	.064	.071	.048	.053
	5	.111	.114	.089	.094	.055	.059	.043	.047	.115	.116	.090	.094	.058	.062	.044	.047
	6	.121	.118	.093	.097	.057	.060	.044	.048	.114	.111	.088	.090	.057	.059	.042	.044
	7	.111	.107	.091	.093	.057	.059	.042	.044	.113	.109	.090	.088	.058	.059	.043	.044
λ = .7																	
	2	.190	.157	.129	.131	.075	.091	.056	.070	.255	.151	.125	.127	.072	.084	.056	.067
	3	.126	.121	.093	.101	.059	.067	.045	.050	.151	.127	.102	.107	.063	.072	.048	.055
	4	.126	.122	.095	.102	.059	.066	.045	.049	.153	.130	.107	.105	.063	.068	.050	.054
	5	.119	.115	.092	.093	.057	.060	.043	.046	.120	.114	.092	.093	.056	.060	.044	.047
	6	.126	.115	.094	.094	.060	.061	.044	.046	.113	.105	.087	.087	.055	.056	.042	.043
	7	.203	.108	.090	.088	.057	.059	.043	.044	.116	.107	.089	.085	.056	.055	.044	.044
ϕ = .3																	
	2	.199	.206	.159	.162	.096	.097	.076	.078	.198	.204	.156	.162	.096	.099	.071	.072
	3	.163	.166	.130	.133	.084	.085	.060	.061	.169	.171	.138	.141	.085	.086	.063	.063
	4	.162	.162	.125	.125	.084	.083	.063	.063	.173	.176	.144	.142	.085	.085	.064	.064
	5	.158	.157	.128	.126	.079	.077	.062	.062	.156	.158	.130	.127	.079	.079	.059	.059
	6	.160	.157	.125	.125	.080	.078	.063	.060	.153	.153	.128	.125	.078	.077	.058	.057
	7	.157	.152	.125	.123	.078	.076	.060	.059	.154	.150	.129	.123	.079	.077	.059	.057

Note. Mod. Asym = Moderate Asymmetry; Mod. Asym-Alt = Moderate Asymmetry-Alternating; Ext. Asym = Exteme Asymmetry; Ext. Asym-Alt = Extreme Asymmetry-Alternating. ML = robust normal-theory maximum likelihood; ULS = robust categorical least squares.

Efficiency = $\sum_{1}^{Nreps}\left(\theta_i-\bar{\theta}\right)^2\Big/N-1$, Model 2, Underlying Distribution = Normal

		Ext. Asym.								Ext. Asym.-Alt.								Mod. Asym.							
		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600	
param.	cats	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS
λ = .3																									
	2	.151	.224	.123	.183	.078	.114	.057	.081	.138	.199	.110	.164	.072	.107	.053	.080	.118	.153	.096	.125	.064	.082	.048	.062
	3	.130	.163	.106	.132	.067	.082	.052	.063	.119	.155	.097	.124	.064	.082	.048	.062	.110	.125	.090	.102	.058	.066	.045	.051
	4	.122	.142	.099	.115	.064	.074	.048	.056	.113	.137	.092	.110	.061	.073	.045	.054	.113	.125	.093	.102	.060	.065	.045	.049
	5	.116	.130	.095	.107	.061	.068	.046	.052	.110	.125	.090	.104	.058	.067	.044	.050	.110	.119	.090	.098	.058	.062	.044	.047
	6	.113	.124	.093	.101	.060	.066	.045	.049	.110	.122	.090	.099	.058	.065	.044	.048	.110	.116	.089	.094	.056	.060	.044	.046
	7	.110	.118	.092	.099	.060	.065	.045	.049	.109	.120	.089	.097	.057	.062	.044	.048	.107	.112	.087	.091	.056	.059	.044	.046
λ = .4																									
	2	.160	.223	.125	.176	.079	.107	.061	.082	.140	.193	.112	.158	.073	.103	.054	.081	.120	.152	.097	.123	.063	.079	.046	.059
	3	.128	.154	.104	.125	.069	.083	.051	.061	.114	.147	.095	.121	.060	.076	.047	.060	.104	.118	.085	.096	.056	.064	.043	.048
	4	.118	.134	.096	.110	.062	.070	.047	.053	.109	.130	.088	.104	.059	.070	.044	.053	.107	.116	.088	.097	.056	.061	.042	.046
	5	.112	.122	.091	.100	.059	.065	.045	.049	.106	.120	.088	.099	.055	.063	.043	.049	.104	.112	.087	.093	.054	.058	.042	.045
	6	.109	.117	.088	.095	.057	.061	.044	.047	.105	.118	.087	.096	.055	.061	.043	.047	.104	.109	.083	.088	.056	.059	.042	.044
	7	.107	.112	.087	.092	.057	.060	.043	.045	.102	.112	.084	.093	.054	.059	.041	.045	.098	.103	.083	.086	.053	.056	.040	.042
λ = .5																									
	2	.167	.211	.129	.166	.081	.103	.059	.075	.144	.179	.111	.146	.077	.102	.053	.078	.116	.141	.092	.113	.060	.075	.046	.057
	3	.127	.146	.103	.118	.065	.074	.050	.057	.114	.147	.092	.116	.059	.074	.045	.056	.097	.109	.079	.089	.052	.058	.040	.045
	4	.113	.124	.092	.100	.060	.066	.046	.050	.105	.124	.083	.098	.054	.064	.041	.049	.100	.109	.083	.089	.051	.056	.041	.045
	5	.106	.114	.087	.092	.057	.061	.042	.045	.099	.112	.081	.092	.051	.059	.041	.046	.097	.103	.078	.083	.050	.053	.038	.040
	6	.102	.107	.084	.088	.055	.057	.041	.044	.098	.107	.079	.088	.051	.057	.040	.044	.097	.101	.078	.082	.051	.054	.039	.041
	7	.102	.106	.082	.085	.054	.056	.041	.043	.096	.105	.077	.085	.052	.057	.039	.042	.094	.098	.076	.079	.050	.051	.037	.039
λ = .6																									
	2	.163	.194	.132	.153	.076	.092	.058	.070	.149	.170	.117	.139	.080	.096	.054	.076	.113	.133	.088	.107	.058	.070	.045	.055
	3	.128	.139	.100	.109	.062	.069	.047	.052	.109	.136	.087	.108	.056	.069	.043	.054	.089	.100	.073	.082	.048	.054	.037	.041
	4	.108	.114	.086	.091	.057	.061	.042	.046	.097	.115	.080	.094	.051	.060	.039	.046	.093	.099	.076	.082	.047	.051	.037	.040
	5	.098	.104	.080	.084	.051	.055	.040	.042	.093	.105	.075	.084	.048	.054	.037	.042	.088	.093	.073	.077	.046	.050	.035	.037
	6	.095	.100	.078	.081	.050	.052	.038	.039	.093	.102	.071	.078	.046	.051	.036	.040	.087	.091	.070	.073	.045	.047	.035	.037
	7	.092	.095	.075	.076	.050	.051	.037	.038	.088	.096	.072	.078	.046	.051	.035	.038	.085	.088	.070	.072	.045	.046	.033	.035
λ = .7																									
	2	.169	.180	.134	.142	.076	.088	.057	.066	.157	.161	.117	.128	.082	.091	.053	.073	.108	.124	.086	.100	.053	.062	.041	.049
	3	.119	.123	.090	.095	.058	.063	.045	.049	.107	.126	.083	.104	.053	.066	.040	.049	.082	.091	.066	.074	.043	.048	.033	.037
	4	.101	.106	.081	.085	.051	.055	.038	.041	.090	.104	.071	.084	.047	.056	.036	.042	.083	.089	.067	.072	.042	.046	.034	.036
	5	.092	.093	.072	.076	.047	.049	.035	.037	.086	.096	.067	.077	.044	.049	.034	.038	.081	.085	.064	.067	.041	.043	.031	.033
	6	.088	.090	.069	.072	.044	.046	.034	.035	.082	.089	.065	.071	.041	.046	.032	.036	.078	.082	.063	.066	.040	.041	.031	.032
	7	.084	.085	.066	.068	.043	.044	.032	.033	.078	.085	.062	.068	.042	.046	.031	.034	.078	.080	.059	.061	.040	.041	.030	.031
ϕ = .3																									
	2	.196	.250	.152	.189	.097	.113	.068	.076	.213	.213	.156	.161	.094	.094	.073	.071	.156	.170	.118	.126	.074	.077	.056	.058
	3	.151	.168	.122	.133	.079	.083	.063	.065	.148	.149	.119	.120	.078	.077	.057	.056	.135	.142	.104	.107	.067	.068	.052	.053
	4	.137	.148	.113	.118	.070	.073	.057	.058	.137	.141	.112	.111	.069	.069	.058	.058	.129	.134	.104	.105	.066	.067	.050	.051
	5	.136	.143	.105	.110	.067	.069	.052	.053	.128	.130	.112	.112	.069	.069	.052	.052	.128	.132	.101	.104	.066	.067	.050	.051
	6	.127	.133	.104	.106	.068	.069	.049	.050	.122	.126	.103	.105	.068	.068	.053	.052	.122	.124	.102	.103	.064	.066	.050	.050
	7	.126	.133	.110	.113	.065	.066	.052	.052	.126	.128	.097	.099	.065	.065	.051	.051	.125	.128	.102	.103	.063	.063	.048	.047

		Mod. Asym.-Alt.								Symmetric							
		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600	
param.	cats	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS
λ = .3																	
	2	.119	.154	.097	.127	.063	.082	.048	.063	.119	.150	.095	.121	.063	.080	.047	.060
	3	.110	.125	.087	.100	.057	.065	.045	.051	.110	.126	.088	.101	.058	.067	.045	.051
	4	.108	.122	.089	.099	.058	.065	.043	.048	.109	.119	.086	.094	.058	.064	.045	.049
	5	.108	.117	.087	.095	.057	.062	.043	.047	.106	.114	.086	.093	.056	.060	.043	.046
	6	.106	.115	.087	.095	.057	.061	.043	.046	.105	.112	.086	.091	.055	.058	.042	.045
	7	.106	.113	.087	.093	.056	.060	.042	.044	.105	.111	.085	.090	.056	.059	.042	.044
λ = .4																	
	2	.118	.152	.097	.124	.061	.079	.046	.060	.116	.146	.093	.116	.060	.075	.045	.057
	3	.106	.120	.085	.096	.055	.063	.041	.047	.107	.122	.085	.098	.057	.065	.042	.049
	4	.103	.115	.085	.095	.056	.062	.042	.047	.102	.112	.083	.090	.053	.058	.041	.045
	5	.101	.110	.083	.089	.053	.058	.041	.044	.101	.109	.081	.087	.053	.057	.040	.043
	6	.098	.106	.083	.089	.054	.058	.040	.043	.101	.107	.081	.086	.052	.056	.040	.043
	7	.101	.107	.081	.085	.052	.055	.041	.043	.100	.106	.079	.084	.053	.056	.040	.042
λ = .5																	
	2	.114	.145	.091	.114	.059	.075	.045	.056	.113	.138	.089	.109	.058	.072	.043	.053
	3	.097	.108	.081	.091	.051	.058	.040	.045	.100	.114	.080	.092	.053	.061	.039	.045
	4	.098	.110	.079	.088	.051	.058	.039	.043	.096	.105	.076	.084	.049	.054	.039	.043
	5	.096	.104	.075	.082	.050	.055	.037	.041	.094	.101	.075	.079	.048	.052	.037	.040
	6	.093	.101	.075	.082	.050	.053	.037	.040	.089	.095	.075	.080	.048	.051	.037	.039
	7	.093	.098	.075	.080	.047	.050	.037	.039	.093	.098	.073	.077	.048	.052	.037	.039
λ = .6																	
	2	.108	.132	.087	.108	.055	.069	.042	.052	.104	.124	.085	.102	.054	.067	.042	.051
	3	.091	.101	.073	.082	.048	.054	.036	.041	.092	.106	.075	.085	.048	.056	.037	.042
	4	.086	.097	.070	.079	.046	.052	.035	.040	.087	.095	.070	.076	.045	.050	.034	.038
	5	.084	.091	.068	.075	.045	.049	.034	.037	.084	.091	.069	.074	.044	.047	.034	.037
	6	.084	.091	.068	.075	.045	.048	.033	.035	.082	.088	.067	.071	.043	.046	.033	.035
	7	.083	.088	.067	.072	.044	.047	.034	.036	.081	.087	.066	.070	.044	.046	.032	.035
λ = .7																	
	2	.104	.124	.082	.099	.051	.064	.039	.049	.102	.118	.080	.094	.051	.062	.039	.046
	3	.081	.091	.066	.074	.044	.049	.033	.037	.083	.094	.068	.076	.044	.050	.033	.038
	4	.078	.088	.064	.072	.041	.047	.032	.036	.079	.085	.063	.069	.040	.044	.030	.033
	5	.076	.083	.061	.067	.040	.044	.030	.033	.074	.079	.060	.066	.038	.042	.029	.032
	6	.073	.079	.061	.067	.039	.042	.029	.031	.073	.078	.060	.064	.038	.041	.029	.031
	7	.072	.077	.059	.063	.037	.040	.029	.031	.073	.077	.057	.061	.037	.039	.028	.030
ϕ = .3																	
	2	.148	.157	.116	.120	.077	.079	.058	.059	.144	.153	.113	.119	.075	.078	.056	.058
	3	.135	.141	.107	.110	.066	.067	.050	.051	.132	.136	.107	.110	.067	.068	.052	.052
	4	.125	.129	.104	.107	.066	.067	.051	.052	.121	.125	.096	.099	.066	.067	.050	.050
	5	.125	.128	.100	.102	.065	.065	.050	.050	.123	.127	.098	.100	.064	.065	.050	.050
	6	.121	.125	.100	.102	.065	.066	.049	.049	.119	.123	.096	.099	.061	.063	.048	.048
	7	.121	.124	.099	.101	.065	.065	.047	.047	.119	.123	.097	.098	.062	.063	.048	.048

Note. Mod. Asym = Moderate Asymmetry; Mod. Asym-Alt = Moderate Asymmetry-Alternating; Ext. Asym = Exteme Asymmetry; Ext. Asym-Alt = Extreme Asymmetry-Alternating. ML = robust normal-theory maximum likelihood; ULS = robust categorical least squares.

Efficiency = $\sum_{1}^{Nreps}\left(\theta_i-\bar{\theta}\right)^2\Big/N-1$, Model 2, Underlying Distribution = Skew 2, Kurtosis 7

		Ext. Asym.								Ext.Asym.-Alt.								Mod. Asym.							
		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600	
param.	cats	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS
λ = .3																									
	2	.157	.224	.127	.193	.097	.120	.124	.087	.184	.242	.137	.191	.081	.124	.059	.102	.127	.172	.101	.135	.065	.086	.049	.065
	3	.139	.192	.112	.146	.071	.092	.054	.070	.120	.166	.096	.129	.062	.082	.048	.064	.109	.124	.088	.101	.056	.065	.044	.050
	4	.131	.162	.105	.127	.066	.080	.052	.062	.113	.138	.090	.111	.059	.072	.046	.056	.112	.123	.093	.102	.060	.066	.045	.050
	5	.122	.141	.099	.112	.064	.072	.049	.055	.110	.128	.088	.103	.058	.067	.044	.051	.112	.116	.091	.095	.059	.062	.045	.047
	6	.119	.130	.095	.104	.061	.067	.047	.052	.107	.119	.087	.097	.059	.065	.043	.047	.119	.123	.098	.101	.062	.064	.048	.049
	7	.119	.125	.095	.102	.062	.065	.048	.050	.107	.117	.085	.094	.057	.062	.043	.047	.115	.117	.092	.093	.061	.061	.047	.048
λ = .4																									
	2	.168	.216	.133	.186	.111	.112	.164	.084	.198	.254	.146	.191	.089	.117	.064	.097	.123	.159	.101	.129	.065	.083	.049	.063
	3	.141	.181	.112	.138	.071	.087	.054	.066	.116	.162	.091	.120	.060	.079	.045	.060	.101	.115	.083	.094	.053	.060	.041	.047
	4	.130	.151	.103	.117	.065	.074	.050	.058	.108	.132	.086	.104	.056	.068	.042	.051	.109	.117	.088	.095	.058	.062	.044	.047
	5	.119	.130	.097	.106	.062	.068	.047	.052	.105	.122	.084	.097	.054	.062	.041	.047	.107	.109	.087	.089	.056	.057	.043	.044
	6	.116	.124	.094	.099	.061	.064	.046	.049	.103	.112	.085	.095	.054	.059	.042	.046	.118	.116	.093	.091	.062	.062	.047	.046
	7	.116	.119	.090	.093	.059	.061	.045	.046	.102	.111	.082	.089	.053	.058	.041	.045	.112	.110	.089	.088	.058	.058	.044	.044
λ = .5																									
	2	.168	.205	.133	.169	.126	.104	.205	.078	.229	.258	.174	.199	.099	.112	.071	.089	.120	.147	.099	.122	.063	.077	.048	.060
	3	.139	.161	.111	.130	.072	.083	.054	.063	.114	.154	.090	.119	.059	.075	.044	.057	.093	.106	.077	.087	.050	.057	.038	.042
	4	.126	.138	.099	.110	.065	.071	.049	.054	.102	.123	.081	.098	.053	.064	.040	.048	.105	.110	.084	.088	.052	.055	.041	.043
	5	.117	.124	.094	.100	.060	.064	.047	.049	.098	.110	.080	.091	.052	.059	.039	.045	.099	.099	.083	.083	.052	.053	.040	.041
	6	.109	.112	.089	.092	.058	.060	.044	.045	.097	.107	.077	.085	.050	.056	.038	.042	.114	.107	.090	.086	.059	.056	.044	.042
	7	.109	.108	.086	.086	.056	.056	.043	.043	.094	.102	.076	.082	.049	.053	.038	.041	.103	.099	.084	.081	.054	.052	.041	.040
λ = .6																									
	2	.172	.191	.137	.159	.147	.099	.250	.072	.258	.272	.213	.205	.110	.107	.079	.084	.119	.141	.095	.113	.060	.072	.046	.054
	3	.139	.153	.108	.117	.069	.076	.051	.056	.112	.147	.088	.116	.058	.072	.042	.052	.087	.097	.071	.079	.046	.052	.035	.040
	4	.122	.127	.097	.101	.060	.064	.047	.050	.094	.111	.076	.090	.049	.057	.037	.044	.096	.100	.076	.079	.049	.051	.037	.039
	5	.109	.111	.088	.091	.055	.057	.043	.045	.090	.102	.072	.081	.048	.055	.035	.040	.092	.090	.073	.073	.047	.047	.037	.036
	6	.104	.103	.083	.082	.053	.053	.040	.041	.088	.096	.070	.078	.045	.049	.034	.038	.105	.096	.084	.077	.054	.051	.041	.039
	7	.099	.096	.080	.077	.051	.050	.038	.039	.085	.091	.069	.075	.043	.048	.034	.037	.099	.093	.076	.072	.051	.048	.038	.036
λ = .7																									
	2	.177	.173	.137	.146	.166	.089	.299	.067	.289	.272	.201	.205	.119	.104	.084	.078	.114	.126	.092	.104	.057	.066	.043	.049
	3	.132	.137	.102	.106	.064	.067	.049	.052	.107	.133	.086	.107	.055	.067	.041	.051	.077	.086	.062	.069	.040	.045	.031	.035
	4	.110	.112	.090	.092	.056	.058	.042	.044	.088	.101	.070	.081	.045	.053	.034	.040	.084	.086	.068	.070	.043	.045	.033	.034
	5	.100	.099	.079	.079	.051	.052	.038	.039	.082	.091	.064	.073	.042	.047	.032	.036	.083	.080	.065	.064	.042	.041	.031	.031
	6	.093	.090	.073	.072	.047	.047	.035	.035	.077	.085	.061	.067	.040	.045	.030	.033	.095	.086	.076	.070	.048	.044	.037	.034
	7	.090	.086	.071	.068	.046	.045	.034	.033	.073	.079	.061	.066	.039	.042	.030	.032	.086	.080	.067	.063	.044	.041	.033	.031
ϕ = .3																									
	2	.196	.228	.152	.187	.092	.109	.072	.082	.279	.321	.214	.221	.118	.113	.081	.086	.157	.177	.118	.128	.077	.082	.056	.060
	3	.167	.208	.131	.151	.081	.088	.062	.066	.148	.154	.116	.117	.076	.075	.055	.054	.126	.131	.101	.105	.065	.066	.049	.050
	4	.151	.164	.121	.128	.075	.078	.056	.058	.130	.135	.105	.107	.069	.069	.053	.053	.127	.129	.103	.104	.066	.067	.049	.050
	5	.138	.144	.110	.113	.071	.072	.055	.056	.124	.128	.104	.106	.067	.067	.050	.050	.125	.125	.100	.099	.065	.062	.048	.046
	6	.133	.134	.110	.111	.068	.068	.054	.053	.121	.122	.098	.098	.064	.063	.048	.048	.135	.129	.107	.103	.068	.064	.052	.050
	7	.131	.131	.108	.105	.067	.067	.051	.050	.120	.121	.099	.099	.065	.065	.047	.047	.126	.122	.104	.099	.067	.064	.051	.049

		Mod.Asym.-Alt.								Symmetric							
		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600	
param.	cats	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS
λ = .3																	
	2	.120	.158	.094	.124	.062	.082	.047	.062	.117	.149	.094	.120	.061	.078	.046	.059
	3	.108	.124	.086	.100	.055	.063	.043	.049	.110	.132	.088	.105	.058	.069	.044	.052
	4	.110	.125	.086	.098	.057	.065	.043	.049	.116	.134	.094	.108	.060	.069	.046	.052
	5	.106	.116	.086	.095	.056	.061	.044	.048	.108	.118	.087	.094	.058	.062	.044	.047
	6	.109	.120	.088	.095	.057	.061	.044	.047	.109	.114	.087	.092	.057	.060	.044	.046
	7	.109	.114	.088	.094	.057	.059	.043	.046	.106	.111	.088	.092	.058	.060	.044	.046
λ = .4																	
	2	.115	.149	.091	.118	.059	.077	.045	.059	.115	.144	.091	.114	.060	.075	.045	.057
	3	.099	.114	.083	.095	.053	.061	.041	.047	.106	.126	.086	.101	.055	.064	.041	.049
	4	.101	.113	.082	.093	.054	.061	.041	.046	.111	.125	.089	.100	.058	.066	.044	.049
	5	.102	.110	.081	.088	.053	.057	.041	.045	.103	.110	.083	.091	.055	.060	.041	.044
	6	.105	.111	.085	.091	.055	.058	.042	.045	.101	.105	.082	.086	.054	.056	.041	.043
	7	.103	.107	.084	.087	.054	.056	.041	.042	.103	.106	.083	.085	.055	.056	.042	.042
λ = .5																	
	2	.109	.138	.087	.111	.057	.073	.044	.056	.109	.133	.087	.107	.057	.069	.043	.054
	3	.094	.107	.076	.087	.050	.057	.038	.043	.099	.116	.080	.094	.052	.061	.039	.046
	4	.095	.106	.078	.087	.049	.056	.038	.043	.107	.120	.084	.092	.055	.060	.042	.046
	5	.095	.102	.076	.081	.049	.053	.038	.041	.095	.101	.077	.083	.050	.053	.038	.041
	6	.098	.104	.078	.083	.051	.053	.039	.041	.095	.099	.077	.079	.049	.050	.037	.038
	7	.096	.099	.077	.080	.049	.050	.038	.039	.098	.097	.078	.078	.051	.051	.038	.037
λ = .6																	
	2	.104	.127	.083	.103	.054	.068	.041	.052	.103	.120	.083	.099	.055	.066	.042	.050
	3	.087	.098	.070	.080	.045	.050	.034	.039	.091	.105	.075	.086	.048	.056	.036	.042
	4	.085	.095	.070	.079	.045	.051	.035	.039	.096	.103	.079	.084	.050	.054	.039	.042
	5	.086	.091	.071	.076	.045	.048	.034	.036	.086	.092	.069	.073	.045	.048	.034	.037
	6	.088	.092	.071	.075	.046	.048	.036	.037	.086	.087	.068	.069	.045	.046	.033	.034
	7	.085	.088	.069	.070	.044	.046	.034	.036	.085	.087	.071	.071	.045	.045	.034	.034
λ = .7																	
	2	.099	.118	.078	.097	.050	.063	.038	.047	.100	.113	.079	.092	.051	.060	.038	.045
	3	.077	.087	.062	.070	.040	.046	.030	.035	.086	.097	.069	.078	.044	.050	.033	.038
	4	.077	.086	.063	.070	.040	.046	.030	.034	.089	.095	.070	.075	.045	.049	.034	.037
	5	.076	.080	.060	.065	.040	.043	.030	.032	.077	.081	.063	.066	.040	.043	.030	.032
	6	.079	.081	.063	.065	.041	.042	.031	.032	.075	.075	.062	.063	.040	.040	.030	.030
	7	.076	.077	.060	.060	.038	.039	.030	.031	.077	.076	.061	.061	.040	.040	.030	.030
ϕ = .3																	
	2	.143	.153	.118	.122	.074	.076	.055	.056	.135	.145	.113	.119	.071	.074	.055	.057
	3	.122	.126	.100	.103	.063	.064	.051	.051	.128	.132	.102	.105	.069	.070	.048	.049
	4	.126	.129	.099	.101	.064	.065	.049	.049	.131	.134	.104	.106	.066	.066	.052	.052
	5	.122	.122	.100	.099	.064	.064	.048	.048	.123	.125	.100	.099	.062	.063	.050	.049
	6	.126	.128	.100	.099	.066	.066	.048	.047	.122	.124	.097	.097	.065	.065	.046	.045
	7	.119	.120	.097	.098	.064	.062	.048	.047	.125	.125	.099	.098	.062	.061	.049	.048

Note. Mod. Asym = Moderate Asymmetry; Mod. Asym-Alt = Moderate Asymmetry-Alternating; Ext. Asym = Exteme Asymmetry; Ext. Asym-Alt = Extreme Asymmetry-Alternating. ML = robust normal-theory maximum likelihood; ULS = robust categorical least squares.

95% Confidence Interval Coverage, Model 1, Underlying Distribution = Normal

		Ext. Asym.								Ext. Asym.-Alt.								Mod. Asym.								Mod.Asym.-Alt.								Symmetric							
		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600	
param.	cats	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS
λ = .3																																									
	2	.750	.841	.783	.896	.725	.931	.640	.932	.808	.867	.806	.893	.757	.929	.687	.935	.873	.921	.866	.930	.819	.941	.754	.948	.877	.912	.869	.922	.837	.936	.794	.949	.875	.915	.882	.921	.854	.939	.778	.938
	3	.851	.893	.862	.923	.817	.933	.759	.939	.856	.892	.877	.921	.864	.949	.820	.953	.924	.928	.920	.938	.916	.941	.896	.944	.912	.927	.911	.931	.920	.946	.904	.942	.900	.913	.910	.929	.906	.932	.887	.943
	4	.885	.910	.890	.923	.867	.937	.836	.941	.894	.912	.902	.926	.900	.942	.874	.952	.917	.916	.917	.923	.916	.936	.904	.940	.907	.918	.916	.923	.915	.940	.911	.939	.912	.915	.920	.927	.921	.936	.922	.945
	5	.897	.919	.895	.921	.895	.936	.883	.940	.905	.905	.910	.916	.915	.941	.896	.954	.918	.902	.921	.919	.926	.937	.923	.943	.917	.903	.919	.907	.929	.928	.936	.944	.910	.895	.930	.923	.938	.935	.939	.942
	6	.909	.906	.915	.930	.911	.939	.899	.938	.904	.903	.919	.919	.922	.943	.906	.942	.918	.899	.923	.914	.929	.930	.932	.943	.919	.908	.926	.922	.929	.934	.935	.948	.915	.891	.927	.911	.929	.926	.934	.941
	7	.913	.902	.915	.925	.913	.928	.908	.938	.903	.893	.922	.924	.937	.944	.920	.939	.919	.899	.933	.914	.931	.929	.936	.934	.916	.894	.926	.912	.934	.930	.939	.941	.910	.885	.935	.913	.934	.928	.937	.934
λ = .4																																									
	2	.762	.834	.742	.887	.650	.926	.540	.945	.667	.895	.611	.910	.450	.920	.298	.936	.846	.896	.824	.925	.759	.941	.654	.937	.835	.909	.840	.932	.744	.943	.620	.947	.863	.918	.850	.934	.776	.945	.668	.949
	3	.826	.899	.828	.917	.777	.939	.696	.940	.795	.898	.786	.914	.700	.939	.531	.944	.903	.929	.896	.925	.904	.947	.880	.948	.903	.922	.917	.930	.897	.940	.846	.942	.888	.912	.892	.928	.884	.948	.855	.948
	4	.866	.907	.862	.919	.840	.939	.802	.943	.871	.912	.855	.926	.785	.945	.723	.945	.887	.906	.903	.926	.903	.933	.897	.945	.903	.902	.898	.922	.887	.936	.874	.940	.917	.918	.916	.935	.922	.947	.919	.951
	5	.883	.905	.885	.919	.878	.938	.853	.947	.899	.910	.888	.925	.872	.933	.801	.939	.901	.905	.919	.922	.915	.937	.920	.944	.908	.907	.929	.924	.919	.939	.910	.941	.900	.905	.914	.929	.933	.940	.939	.941
	6	.891	.906	.902	.934	.893	.945	.893	.947	.897	.904	.903	.924	.879	.933	.848	.941	.908	.905	.916	.922	.929	.935	.935	.946	.906	.896	.916	.915	.923	.930	.916	.948	.913	.899	.921	.917	.932	.940	.931	.951
	7	.897	.909	.911	.926	.906	.939	.906	.945	.908	.905	.923	.919	.896	.936	.880	.947	.915	.899	.921	.924	.935	.938	.943	.942	.918	.893	.920	.904	.935	.931	.933	.943	.920	.890	.929	.923	.935	.939	.950	.946
λ = .5																																									
	2	.769	.877	.752	.903	.618	.927	.471	.929	.725	.914	.698	.914	.607	.932	.455	.932	.823	.912	.801	.928	.677	.938	.523	.951	.818	.922	.796	.938	.685	.941	.509	.946	.830	.918	.816	.927	.700	.941	.538	.942
	3	.818	.908	.813	.916	.745	.936	.642	.943	.801	.903	.811	.920	.733	.944	.648	.940	.900	.921	.895	.928	.865	.944	.814	.946	.903	.918	.906	.934	.875	.940	.815	.946	.895	.922	.877	.937	.838	.948	.787	.941
	4	.859	.918	.876	.920	.808	.940	.744	.946	.871	.914	.877	.931	.824	.939	.752	.946	.897	.912	.898	.928	.890	.943	.853	.947	.906	.916	.906	.922	.896	.936	.845	.944	.907	.917	.911	.925	.897	.937	.881	.943
	5	.883	.920	.895	.924	.853	.939	.814	.939	.899	.925	.886	.936	.847	.925	.818	.944	.899	.910	.917	.922	.908	.947	.900	.947	.903	.911	.908	.914	.914	.937	.906	.945	.910	.910	.918	.919	.928	.942	.928	.951
	6	.896	.903	.904	.917	.894	.933	.853	.944	.902	.913	.903	.923	.891	.939	.874	.942	.914	.920	.908	.914	.927	.941	.916	.944	.919	.906	.924	.920	.922	.939	.907	.938	.914	.890	.923	.918	.924	.939	.901	.938
	7	.904	.908	.907	.916	.897	.942	.876	.944	.903	.902	.927	.936	.900	.939	.891	.944	.915	.903	.923	.912	.927	.934	.935	.937	.914	.905	.932	.921	.938	.940	.924	.936	.910	.895	.924	.909	.930	.933	.929	.946
λ = .6																																									
	2	.744	.928	.722	.922	.591	.927	.436	.945	.411	.923	.353	.945	.151	.939	.051	.940	.792	.941	.761	.935	.636	.936	.413	.940	.740	.941	.691	.937	.503	.942	.295	.942	.801	.933	.753	.939	.606	.948	.419	.942
	3	.809	.918	.798	.922	.723	.942	.594	.937	.606	.937	.522	.943	.289	.940	.117	.945	.895	.931	.877	.936	.827	.952	.769	.943	.888	.945	.883	.926	.833	.941	.761	.943	.863	.935	.865	.943	.787	.943	.714	.942
	4	.853	.922	.853	.922	.810	.944	.711	.936	.744	.925	.662	.925	.460	.945	.307	.949	.881	.931	.872	.932	.878	.945	.828	.941	.876	.923	.856	.921	.797	.941	.708	.951	.895	.922	.908	.932	.881	.938	.859	.943
	5	.880	.916	.881	.931	.856	.946	.796	.937	.800	.924	.785	.927	.662	.942	.505	.944	.900	.922	.913	.928	.902	.938	.881	.936	.906	.924	.895	.930	.872	.943	.832	.949	.905	.919	.919	.922	.926	.934	.912	.942
	6	.894	.926	.891	.941	.882	.945	.841	.944	.855	.915	.834	.937	.742	.946	.631	.943	.901	.916	.907	.922	.913	.934	.904	.944	.888	.915	.890	.915	.893	.949	.871	.947	.903	.914	.915	.930	.896	.941	.872	.939
	7	.896	.919	.900	.926	.898	.943	.859	.931	.865	.912	.852	.929	.808	.946	.681	.940	.908	.914	.906	.918	.923	.931	.914	.939	.912	.918	.930	.930	.903	.943	.892	.941	.903	.900	.927	.920	.923	.938	.928	.942
λ = .7																																									
	2	.724	.926	.699	.934	.609	.955	.407	.953	.583	.901	.504	.921	.308	.948	.162	.939	.765	.947	.708	.944	.551	.940	.340	.954	.709	.949	.684	.949	.484	.948	.279	.952	.754	.952	.720	.941	.546	.938	.347	.946
	3	.802	.928	.798	.932	.740	.952	.559	.945	.666	.946	.630	.939	.452	.938	.270	.942	.881	.946	.851	.933	.826	.952	.711	.947	.872	.944	.874	.944	.800	.951	.733	.952	.846	.943	.833	.944	.787	.941	.651	.937
	4	.845	.940	.836	.930	.811	.936	.678	.950	.768	.947	.752	.948	.636	.949	.445	.949	.885	.944	.873	.936	.872	.938	.789	.948	.874	.932	.862	.936	.818	.940	.762	.951	.881	.933	.888	.933	.877	.935	.827	.944
	5	.871	.940	.863	.930	.852	.944	.754	.952	.813	.936	.804	.937	.709	.951	.599	.944	.904	.930	.885	.921	.893	.937	.869	.942	.891	.930	.890	.937	.867	.954	.845	.950	.905	.932	.913	.932	.925	.940	.904	.950
	6	.900	.939	.878	.923	.875	.946	.814	.952	.844	.937	.859	.936	.803	.955	.703	.946	.907	.928	.901	.928	.913	.950	.888	.943	.892	.931	.894	.933	.895	.940	.871	.942	.904	.925	.902	.928	.905	.940	.858	.946
	7	.901	.937	.893	.932	.899	.944	.844	.946	.871	.926	.865	.937	.817	.947	.759	.952	.910	.931	.912	.926	.922	.940	.909	.950	.899	.928	.921	.935	.910	.937	.910	.945	.907	.916	.913	.921	.932	.946	.915	.942
ϕ = .3																																									
	2	.806	.743	.840	.779	.875	.899	.887	.922	.840	.799	.865	.836	.904	.912	.910	.917	.889	.890	.902	.890	.928	.936	.938	.937	.873	.868	.908	.913	.926	.935	.934	.939	.876	.872	.905	.895	.932	.930	.947	.940
	3	.848	.838	.876	.877	.927	.929	.918	.940	.851	.860	.887	.882	.927	.931	.942	.940	.903	.899	.927	.923	.937	.921	.939	.942	.882	.877	.908	.909	.942	.944	.946	.952	.904	.887	.906	.900	.924	.926	.942	.940
	4	.884	.872	.901	.896	.930	.923	.931	.941	.869	.854	.913	.905	.933	.929	.951	.946	.885	.880	.919	.908	.930	.933	.943	.940	.900	.875	.915	.905	.936	.920	.948	.942	.890	.887	.912	.896	.936	.926	.945	.938
	5	.886	.861	.919	.900	.931	.928	.940	.938	.885	.880	.906	.885	.945	.948	.937	.935	.902	.874	.912	.896	.931	.919	.948	.938	.908	.877	.908	.890	.932	.928	.952	.946	.901	.872	.923	.910	.933	.926	.945	.940
	6	.899	.875	.915	.902	.933	.927	.947	.937	.895	.868	.926	.905	.923	.930	.927	.928	.890	.861	.921	.894	.932	.919	.939	.931	.895	.865	.915	.902	.938	.920	.943	.940	.916	.868	.919	.897	.935	.923	.944	.939
	7	.894	.862	.916	.898	.934	.931	.948	.941	.895	.865	.917	.889	.934	.917	.942	.939	.906	.859	.922	.888	.933	.922	.943	.930	.899	.861	.926	.903	.932	.921	.941	.926	.908	.861	.919	.886	.937	.924	.941	.924

Note. Mod. Asym = Moderate Asymmetry; Mod. Asym-Alt = Moderate Asymmetry-Alternating; Ext. Asym = Exteme Asymmetry; Ext. Asym-Alt = Extreme Asymmetry-Alternating. ML = robust normal-theory maximum likelihood; ULS = robust categorical least squares.

95% Confidence Interval Coverage, Model 1, Underlying Distribution = Skew 2, Kurtosis 7

		Ext. Asym.								Ext. Asym.-Alt.								Mod. Asym.								Mod. Asym.-Alt.								Symmetric							
		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600	
param.	cats	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS
λ = .3																																									
	2	.773	.853	.785	.870	.761	.905	.670	.925	.698	.714	.704	.855	.677	.903	.690	.895	.869	.916	.883	.915	.847	.926	.805	.925	.869	.895	.865	.926	.810	.928	.727	.930	.884	.907	.901	.914	.892	.938	.837	.927
	3	.825	.870	.840	.894	.822	.916	.768	.920	.888	.888	.911	.905	.937	.927	.925	.921	.918	.917	.926	.922	.942	.924	.941	.911	.915	.917	.915	.904	.936	.918	.942	.919	.902	.908	.921	.924	.924	.921	.921	.918
	4	.858	.895	.872	.903	.883	.920	.840	.923	.902	.888	.925	.900	.944	.930	.946	.923	.902	.903	.914	.906	.938	.921	.923	.909	.910	.914	.912	.928	.891	.921	.859	.914	.886	.884	.915	.897	.927	.920	.912	.910
	5	.866	.895	.895	.912	.905	.922	.883	.918	.913	.893	.933	.917	.938	.924	.932	.917	.902	.901	.919	.899	.931	.908	.932	.911	.919	.894	.903	.897	.908	.920	.849	.910	.908	.888	.924	.905	.941	.908	.935	.903
	6	.881	.883	.911	.905	.923	.921	.906	.909	.923	.904	.911	.894	.921	.908	.918	.905	.881	.872	.904	.897	.925	.908	.910	.897	.919	.891	.909	.884	.926	.905	.925	.899	.905	.889	.929	.902	.941	.914	.940	.901
	7	.884	.883	.917	.908	.931	.915	.914	.910	.915	.882	.923	.909	.923	.911	.914	.910	.897	.882	.915	.876	.934	.896	.931	.899	.916	.888	.911	.895	.919	.900	.901	.893	.909	.879	.918	.894	.938	.907	.937	.901
λ = .4																																									
	2	.773	.858	.770	.893	.714	.923	.624	.926	.524	.517	.502	.799	.450	.943	.409	.916	.851	.891	.848	.918	.810	.916	.744	.923	.826	.896	.803	.913	.666	.916	.527	.921	.881	.907	.883	.924	.842	.915	.779	.925
	3	.832	.872	.823	.906	.799	.909	.740	.909	.872	.872	.869	.888	.831	.911	.793	.923	.916	.912	.926	.917	.925	.904	.944	.897	.916	.911	.930	.925	.929	.911	.924	.897	.899	.917	.917	.922	.914	.908	.907	.900
	4	.852	.886	.872	.913	.865	.913	.829	.912	.908	.899	.908	.905	.918	.911	.915	.907	.891	.888	.910	.908	.922	.895	.932	.897	.890	.908	.884	.910	.860	.916	.785	.900	.905	.898	.915	.903	.920	.907	.921	.904
	5	.877	.891	.888	.904	.895	.911	.889	.909	.917	.889	.938	.919	.940	.910	.935	.903	.893	.885	.921	.899	.932	.896	.941	.887	.890	.897	.881	.895	.867	.911	.791	.896	.908	.896	.925	.907	.943	.899	.947	.893
	6	.895	.886	.907	.909	.912	.896	.917	.904	.920	.909	.925	.909	.917	.901	.922	.905	.871	.879	.885	.896	.912	.902	.915	.892	.913	.886	.929	.897	.924	.905	.913	.892	.920	.892	.935	.908	.929	.893	.951	.885
	7	.897	.877	.913	.906	.924	.898	.935	.897	.908	.891	.910	.899	.898	.907	.867	.880	.890	.874	.918	.892	.928	.890	.934	.887	.901	.874	.918	.907	.898	.891	.882	.897	.906	.881	.932	.900	.942	.890	.944	.881
λ = .5																																									
	2	.782	.871	.765	.894	.671	.922	.562	.929	.630	.681	.648	.833	.613	.934	.603	.918	.836	.910	.822	.930	.752	.914	.654	.924	.792	.917	.746	.918	.600	.926	.434	.909	.847	.916	.843	.912	.766	.922	.650	.920
	3	.826	.874	.822	.905	.774	.924	.714	.919	.869	.894	.885	.905	.886	.923	.878	.927	.906	.914	.921	.901	.918	.906	.917	.886	.927	.911	.911	.899	.927	.910	.914	.895	.879	.912	.898	.898	.872	.910	.869	.894
	4	.838	.887	.862	.904	.825	.917	.795	.912	.908	.901	.915	.895	.937	.906	.930	.912	.893	.904	.902	.907	.917	.907	.922	.885	.878	.905	.870	.901	.795	.901	.705	.892	.888	.875	.901	.892	.892	.902	.889	.909
	5	.865	.898	.884	.895	.869	.909	.865	.910	.914	.898	.915	.902	.925	.908	.920	.889	.890	.896	.909	.898	.928	.892	.933	.872	.876	.887	.876	.899	.811	.905	.713	.877	.906	.898	.926	.898	.936	.896	.938	.884
	6	.876	.899	.907	.898	.892	.914	.901	.902	.913	.895	.909	.903	.899	.902	.883	.901	.865	.878	.885	.881	.902	.892	.906	.894	.899	.877	.907	.882	.903	.894	.885	.882	.904	.882	.925	.885	.928	.895	.944	.881
	7	.881	.895	.911	.897	.905	.904	.920	.886	.896	.896	.896	.891	.873	.900	.827	.892	.882	.873	.909	.884	.922	.886	.935	.876	.889	.862	.903	.882	.887	.887	.840	.863	.906	.885	.925	.887	.940	.891	.943	.870
λ = .6																																									
	2	.786	.896	.774	.918	.658	.928	.538	.926	.403	.422	.356	.590	.294	.873	.259	.942	.817	.924	.793	.926	.699	.922	.538	.925	.677	.921	.611	.926	.366	.923	.224	.925	.839	.924	.824	.918	.697	.910	.511	.916
	3	.809	.907	.811	.911	.757	.923	.666	.909	.713	.916	.667	.927	.530	.917	.408	.909	.898	.904	.903	.921	.895	.901	.885	.885	.902	.913	.910	.912	.912	.908	.896	.889	.879	.919	.875	.925	.840	.916	.787	.906
	4	.843	.905	.847	.902	.831	.918	.765	.918	.831	.911	.828	.917	.762	.919	.707	.904	.881	.897	.903	.912	.908	.903	.896	.878	.854	.907	.843	.920	.766	.906	.639	.899	.882	.909	.892	.901	.877	.900	.849	.895
	5	.869	.911	.871	.903	.877	.911	.840	.895	.876	.906	.893	.910	.878	.910	.850	.902	.890	.902	.899	.904	.918	.896	.915	.885	.875	.912	.864	.913	.808	.907	.667	.876	.901	.911	.924	.915	.926	.894	.914	.878
	6	.887	.909	.887	.904	.901	.903	.884	.891	.900	.902	.901	.903	.918	.910	.889	.879	.864	.892	.886	.894	.904	.889	.893	.890	.907	.890	.908	.902	.917	.912	.894	.859	.913	.904	.922	.907	.933	.883	.932	.875
	7	.883	.908	.902	.893	.917	.891	.910	.879	.904	.899	.897	.907	.875	.890	.827	.871	.887	.893	.903	.887	.919	.882	.924	.865	.904	.896	.900	.888	.865	.881	.841	.880	.908	.898	.924	.894	.939	.885	.937	.869
ϕ = .7																																									
	2	.765	.937	.755	.946	.664	.952	.510	.935	.595	.607	.563	.717	.546	.914	.526	.939	.774	.947	.777	.952	.663	.938	.449	.921	.634	.956	.606	.948	.355	.938	.222	.916	.798	.950	.762	.944	.602	.937	.421	.909
	3	.810	.929	.825	.939	.766	.944	.639	.922	.796	.945	.790	.956	.738	.938	.648	.928	.879	.918	.903	.928	.892	.915	.846	.886	.903	.936	.907	.929	.898	.905	.872	.889	.864	.951	.865	.945	.824	.925	.710	.911
	4	.831	.921	.856	.928	.833	.930	.736	.916	.873	.934	.876	.935	.861	.925	.816	.908	.875	.910	.904	.924	.907	.913	.887	.891	.833	.922	.828	.919	.697	.912	.561	.886	.884	.925	.887	.928	.882	.914	.820	.890
	5	.857	.909	.891	.924	.880	.928	.820	.901	.885	.922	.906	.924	.904	.899	.894	.900	.880	.910	.907	.913	.921	.909	.899	.894	.857	.921	.839	.914	.752	.900	.608	.883	.895	.915	.910	.915	.926	.908	.908	.870
	6	.867	.904	.905	.926	.909	.926	.865	.897	.912	.929	.905	.912	.896	.904	.862	.895	.866	.911	.891	.913	.905	.906	.882	.883	.891	.913	.910	.922	.895	.894	.882	.883	.912	.926	.924	.920	.931	.895	.924	.873
	7	.880	.893	.907	.920	.921	.916	.897	.888	.884	.922	.868	.917	.846	.899	.791	.888	.879	.898	.909	.915	.930	.897	.917	.873	.885	.907	.886	.905	.851	.877	.803	.862	.909	.909	.917	.916	.939	.895	.926	.867
ϕ = .3																																									
	2	.770	.777	.803	.783	.878	.909	.893	.930	.781	.572	.832	.848	.838	.832	.818	.880	.868	.850	.874	.880	.935	.925	.936	.939	.875	.862	.894	.895	.936	.928	.930	.924	.885	.883	.900	.890	.937	.917	.948	.941
	3	.826	.835	.851	.863	.917	.931	.918	.932	.868	.836	.885	.877	.932	.935	.929	.929	.894	.885	.915	.904	.928	.929	.941	.937	.894	.885	.907	.910	.923	.926	.942	.939	.911	.901	.909	.903	.928	.933	.943	.937
	4	.863	.848	.875	.862	.936	.935	.931	.940	.860	.846	.904	.889	.931	.928	.917	.916	.869	.859	.901	.886	.933	.922	.942	.935	.892	.876	.923	.912	.928	.920	.940	.930	.875	.868	.894	.876	.950	.932	.949	.933
	5	.864	.850	.884	.883	.934	.938	.945	.942	.871	.850	.903	.885	.944	.928	.929	.916	.880	.879	.896	.881	.941	.929	.937	.934	.889	.864	.905	.898	.933	.924	.938	.920	.892	.869	.903	.891	.945	.936	.949	.929
	6	.868	.842	.900	.885	.941	.935	.945	.936	.889	.874	.907	.891	.938	.918	.941	.935	.858	.820	.892	.860	.937	.918	.943	.935	.897	.863	.919	.888	.937	.924	.934	.931	.897	.868	.911	.891	.938	.925	.948	.936
	7	.867	.848	.899	.889	.939	.930	.947	.939	.922	.874	.909	.884	.941	.928	.926	.914	.870	.836	.902	.882	.940	.919	.945	.928	.895	.838	.907	.884	.929	.916	.938	.927	.901	.857	.913	.877	.936	.927	.945	.930

Note. Mod. Asym = Moderate Asymmetry; Mod. Asym-Alt = Moderate Asymmetry-Alternating; Ext. Asym = Exteme Asymmetry; Ext. Asym-Alt = Extreme Asymmetry-Alternating. ML = robust normal-theory maximum likelihood; ULS = robust categorical least squares.

95% Confidence Interval Coverage, Model 2, Underlying Distribution = Normal

		Ext. Asym.								Ext. Asym.-Alt.								Mod. Asym.								Mod. Asym.-Alt.								Symmetric							
		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600	
param.	cats	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS
λ = .3																																									
	2	.737	.872	.733	.897	.672	.929	.556	.948	.759	.907	.748	.914	.637	.931	.517	.941	.865	.929	.862	.934	.805	.937	.706	.949	.864	.931	.861	.927	.802	.941	.699	.942	.875	.921	.876	.936	.827	.934	.736	.948
	3	.827	.905	.833	.922	.788	.947	.739	.936	.847	.914	.848	.927	.801	.934	.710	.945	.906	.929	.909	.935	.904	.946	.885	.942	.908	.927	.921	.942	.914	.946	.880	.941	.897	.932	.917	.934	.891	.944	.869	.947
	4	.869	.910	.866	.923	.847	.936	.816	.946	.880	.919	.883	.927	.854	.937	.816	.945	.896	.910	.907	.924	.897	.942	.895	.945	.904	.917	.912	.929	.910	.941	.905	.945	.897	.913	.917	.937	.919	.938	.915	.933
	5	.884	.913	.893	.922	.898	.937	.863	.940	.898	.921	.904	.923	.901	.941	.875	.953	.896	.904	.913	.909	.917	.939	.921	.944	.905	.910	.920	.920	.927	.932	.924	.945	.913	.914	.920	.923	.936	.937	.936	.942
	6	.897	.913	.905	.926	.906	.936	.888	.952	.907	.910	.904	.925	.909	.941	.901	.949	.895	.897	.920	.910	.932	.939	.928	.943	.916	.902	.864	.920	.928	.931	.928	.941	.912	.904	.924	.919	.946	.947	.940	.943
	7	.904	.912	.901	.916	.917	.932	.902	.940	.900	.900	.916	.921	.928	.944	.907	.942	.907	.906	.924	.910	.936	.935	.932	.937	.906	.902	.918	.910	.939	.930	.930	.942	.909	.889	.925	.917	.933	.931	.941	.942
λ = .4																																									
	2	.705	.872	.691	.906	.571	.936	.418	.934	.647	.911	.636	.912	.483	.932	.284	.934	.820	.923	.809	.931	.680	.939	.534	.948	.824	.918	.807	.923	.675	.942	.524	.947	.832	.924	.824	.937	.722	.948	.562	.952
	3	.799	.912	.809	.925	.717	.930	.625	.943	.814	.917	.796	.921	.689	.942	.537	.942	.910	.925	.901	.935	.880	.935	.832	.944	.894	.928	.900	.937	.870	.939	.843	.950	.877	.921	.892	.937	.857	.939	.817	.944
	4	.851	.915	.852	.931	.811	.942	.741	.941	.852	.919	.864	.932	.789	.938	.702	.944	.882	.916	.896	.919	.895	.946	.869	.950	.901	.920	.901	.927	.879	.938	.867	.945	.900	.915	.913	.933	.912	.945	.898	.947
	5	.881	.919	.880	.926	.857	.940	.824	.946	.885	.918	.880	.929	.854	.947	.799	.943	.888	.905	.904	.909	.917	.939	.895	.939	.898	.902	.913	.926	.913	.939	.903	.943	.905	.908	.923	.924	.926	.933	.934	.945
	6	.885	.921	.895	.926	.893	.942	.859	.941	.891	.908	.891	.920	.880	.941	.842	.943	.896	.901	.912	.919	.910	.929	.916	.935	.914	.907	.795	.926	.916	.928	.924	.940	.904	.904	.921	.921	.937	.942	.930	.943
	7	.894	.917	.900	.925	.903	.935	.878	.948	.902	.903	.905	.914	.904	.943	.871	.942	.912	.911	.915	.913	.935	.931	.926	.947	.909	.901	.926	.916	.930	.935	.924	.941	.914	.892	.931	.920	.928	.933	.937	.940
λ = .5																																									
	2	.685	.882	.672	.902	.510	.933	.309	.942	.566	.918	.542	.919	.322	.922	.135	.932	.786	.922	.756	.934	.552	.942	.348	.944	.766	.921	.730	.931	.521	.938	.308	.945	.784	.926	.768	.935	.562	.941	.345	.951
	3	.784	.918	.776	.921	.669	.943	.516	.941	.747	.899	.717	.920	.544	.935	.338	.946	.889	.932	.888	.936	.842	.944	.767	.943	.895	.931	.884	.932	.841	.943	.763	.946	.865	.929	.872	.937	.811	.936	.720	.950
	4	.837	.922	.851	.927	.758	.936	.657	.941	.815	.916	.807	.929	.699	.947	.552	.944	.882	.922	.879	.922	.877	.944	.817	.938	.872	.912	.872	.924	.858	.942	.813	.948	.888	.912	.907	.936	.904	.946	.856	.938
	5	.876	.920	.877	.933	.826	.938	.774	.949	.871	.924	.861	.929	.790	.946	.695	.944	.887	.913	.907	.921	.909	.946	.887	.948	.885	.907	.904	.930	.890	.938	.882	.945	.899	.910	.925	.929	.931	.945	.922	.943
	6	.889	.919	.884	.925	.865	.938	.823	.946	.870	.921	.888	.930	.849	.940	.777	.941	.890	.902	.909	.913	.909	.931	.894	.940	.901	.902	.710	.930	.912	.932	.893	.942	.918	.911	.916	.921	.927	.941	.922	.942
	7	.884	.909	.893	.922	.882	.938	.855	.941	.891	.909	.897	.929	.860	.928	.829	.947	.899	.907	.917	.923	.919	.937	.926	.941	.903	.903	.922	.917	.932	.937	.923	.944	.902	.893	.919	.918	.929	.933	.925	.944
λ = .6																																									
	2	.669	.897	.628	.911	.419	.943	.216	.948	.495	.923	.433	.925	.191	.934	.049	.934	.722	.923	.666	.932	.389	.938	.194	.935	.704	.927	.622	.933	.333	.948	.119	.949	.746	.936	.685	.938	.396	.949	.188	.943
	3	.767	.902	.751	.920	.618	.935	.435	.949	.666	.905	.604	.925	.357	.941	.161	.938	.879	.932	.853	.938	.775	.938	.658	.945	.875	.930	.860	.928	.785	.943	.672	.945	.849	.931	.830	.934	.737	.941	.613	.947
	4	.825	.924	.817	.935	.726	.940	.594	.944	.770	.919	.735	.924	.546	.940	.359	.949	.863	.922	.870	.915	.852	.944	.783	.950	.861	.929	.863	.929	.800	.940	.711	.943	.900	.924	.894	.937	.873	.945	.829	.946
	5	.867	.921	.863	.925	.817	.942	.703	.935	.824	.914	.809	.934	.702	.944	.544	.940	.885	.917	.891	.919	.890	.936	.854	.950	.885	.920	.897	.925	.870	.941	.824	.945	.907	.915	.912	.924	.912	.946	.902	.941
	6	.876	.916	.870	.925	.852	.937	.782	.950	.847	.910	.859	.938	.770	.947	.663	.945	.895	.910	.908	.922	.900	.937	.878	.946	.892	.904	.595	.925	.893	.932	.876	.944	.906	.912	.916	.927	.917	.947	.909	.946
	7	.889	.918	.894	.930	.863	.938	.831	.943	.867	.916	.867	.925	.816	.940	.742	.941	.904	.908	.905	.918	.921	.938	.914	.947	.900	.912	.914	.918	.912	.934	.897	.940	.904	.909	.910	.918	.925	.932	.920	.943
λ = .7																																									
	2	.663	.899	.609	.914	.372	.940	.172	.942	.389	.904	.295	.933	.071	.939	.007	.940	.653	.926	.581	.930	.250	.951	.066	.946	.596	.926	.465	.930	.145	.945	.027	.942	.663	.929	.566	.931	.208	.944	.054	.948
	3	.771	.912	.750	.934	.570	.942	.390	.939	.536	.915	.451	.919	.161	.943	.039	.949	.846	.933	.822	.935	.706	.940	.539	.947	.846	.936	.828	.936	.699	.938	.550	.952	.819	.934	.791	.933	.631	.944	.478	.947
	4	.811	.912	.810	.924	.691	.940	.535	.948	.680	.933	.603	.942	.351	.937	.144	.943	.856	.928	.853	.930	.806	.946	.725	.939	.834	.926	.825	.933	.713	.939	.580	.938	.880	.924	.872	.933	.839	.946	.781	.951
	5	.854	.927	.847	.931	.777	.937	.663	.947	.779	.920	.731	.934	.534	.945	.312	.944	.863	.916	.892	.931	.863	.946	.827	.949	.871	.921	.871	.937	.818	.936	.748	.949	.905	.925	.909	.932	.912	.947	.899	.947
	6	.865	.919	.875	.928	.813	.947	.756	.947	.807	.922	.792	.934	.656	.951	.475	.943	.889	.911	.895	.922	.892	.944	.851	.943	.886	.924	.461	.937	.858	.942	.814	.944	.905	.915	.913	.918	.907	.937	.894	.945
	7	.879	.921	.888	.934	.868	.944	.823	.946	.842	.923	.820	.940	.702	.938	.576	.944	.890	.914	.921	.936	.908	.937	.890	.946	.899	.921	.906	.921	.902	.945	.862	.940	.910	.919	.916	.930	.930	.940	.910	.948
ϕ = .3																																									
	2	.815	.779	.869	.845	.890	.905	.922	.941	.847	.785	.873	.831	.922	.901	.928	.923	.895	.861	.925	.904	.941	.935	.956	.943	.896	.877	.923	.911	.934	.929	.942	.936	.917	.898	.928	.918	.937	.932	.937	.932
	3	.889	.863	.906	.882	.921	.922	.902	.925	.897	.855	.912	.899	.929	.928	.947	.951	.897	.872	.932	.922	.939	.931	.934	.938	.898	.873	.915	.901	.945	.940	.948	.940	.914	.901	.915	.910	.946	.941	.935	.936
	4	.910	.880	.915	.905	.944	.935	.919	.939	.922	.870	.925	.915	.950	.944	.930	.923	.918	.866	.921	.904	.944	.936	.942	.935	.915	.880	.932	.913	.945	.938	.945	.940	.919	.905	.932	.919	.938	.927	.950	.937
	5	.904	.875	.931	.911	.946	.933	.945	.937	.924	.902	.915	.886	.930	.928	.945	.942	.909	.870	.926	.890	.928	.916	.942	.939	.913	.870	.931	.904	.937	.928	.945	.929	.919	.876	.927	.900	.938	.924	.930	.928
	6	.926	.891	.930	.914	.942	.925	.952	.936	.918	.879	.925	.906	.928	.916	.928	.926	.913	.871	.924	.866	.950	.926	.938	.936	.923	.867	.931	.904	.934	.922	.948	.936	.924	.876	.930	.903	.944	.942	.956	.946
	7	.916	.866	.910	.873	.940	.934	.936	.940	.913	.876	.946	.915	.938	.927	.938	.936	.907	.849	.916	.869	.953	.934	.944	.937	.918	.852	.922	.895	.938	.916	.953	.950	.916	.839	.932	.885	.943	.925	.950	.933

Note. Mod. Asym = Moderate Asymmetry; Mod. Asym-Alt = Moderate Asymmetry-Alternating; Ext. Asym = Exteme Asymmetry; Ext. Asym-Alt = Extreme Asymmetry-Alternating. ML = robust normal-theory maximum likelihood; ULS = robust categorical least squares.

95% Confidence Interval Coverage, Model 2, Underlying Distribution = Skew 2, Kurtosis 7

		Ext. Asym.								Ext. Asym.-Alt.								Mod. Asym.								Mod. Asym.-Alt.								Symmetric							
		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600	
param.	cats	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS
λ = .3																																									
	2	.732	.871	.754	.891	.695	.920	.584	.932	.646	.551	.675	.843	.666	.922	.614	.909	.847	.909	.864	.918	.822	.936	.783	.926	.848	.906	.851	.924	.752	.924	.644	.916	.888	.914	.893	.931	.858	.931	.811	.924
	3	.808	.881	.819	.908	.798	.935	.746	.932	.885	.884	.899	.909	.904	.923	.897	.909	.901	.906	.926	.915	.941	.922	.930	.907	.907	.914	.928	.923	.941	.925	.938	.918	.904	.915	.915	.925	.925	.921	.918	.916
	4	.831	.883	.857	.909	.868	.923	.821	.915	.902	.892	.923	.911	.938	.916	.930	.909	.893	.902	.910	.912	.924	.914	.932	.913	.881	.900	.902	.919	.880	.923	.834	.910	.887	.892	.905	.902	.918	.916	.915	.910
	5	.868	.904	.881	.912	.881	.931	.869	.925	.903	.900	.923	.912	.937	.921	.935	.907	.893	.897	.911	.909	.930	.915	.933	.907	.893	.900	.902	.907	.884	.915	.827	.892	.908	.901	.925	.915	.940	.906	.934	.898
	6	.882	.896	.901	.912	.919	.918	.907	.911	.911	.905	.920	.913	.917	.907	.921	.912	.864	.868	.887	.893	.912	.902	.914	.901	.901	.883	.920	.900	.928	.908	.918	.897	.902	.893	.920	.906	.940	.916	.941	.902
	7	.877	.890	.901	.902	.922	.908	.914	.906	.900	.886	.911	.910	.914	.910	.889	.903	.889	.872	.912	.899	.932	.901	.927	.894	.900	.881	.911	.891	.919	.906	.899	.900	.906	.887	.921	.897	.930	.899	.939	.900
λ = .4																																									
	2	.715	.880	.728	.885	.647	.923	.483	.924	.571	.531	.596	.801	.586	.928	.540	.911	.841	.906	.835	.910	.749	.922	.647	.911	.802	.905	.774	.918	.621	.917	.453	.904	.861	.913	.866	.920	.787	.910	.678	.909
	3	.788	.884	.802	.907	.766	.922	.653	.919	.867	.862	.895	.903	.865	.913	.839	.910	.918	.917	.918	.915	.935	.914	.923	.893	.909	.916	.922	.914	.932	.910	.925	.890	.888	.907	.900	.913	.905	.917	.885	.900
	4	.832	.886	.843	.918	.839	.915	.772	.909	.903	.885	.926	.911	.923	.906	.927	.904	.886	.902	.905	.903	.921	.898	.918	.885	.880	.909	.880	.910	.830	.906	.747	.895	.878	.899	.906	.905	.906	.896	.893	.882
	5	.870	.899	.880	.910	.880	.915	.850	.891	.908	.891	.919	.907	.934	.906	.935	.888	.887	.893	.907	.898	.931	.895	.930	.876	.873	.889	.878	.897	.834	.890	.757	.879	.904	.890	.915	.895	.935	.888	.938	.883
	6	.875	.891	.891	.906	.899	.908	.888	.896	.910	.896	.905	.900	.912	.893	.896	.881	.870	.864	.890	.895	.895	.885	.901	.875	.895	.875	.912	.881	.911	.898	.897	.873	.909	.890	.916	.895	.940	.886	.941	.861
	7	.877	.880	.905	.904	.917	.909	.903	.898	.888	.876	.910	.902	.878	.894	.838	.862	.887	.859	.907	.884	.924	.882	.926	.873	.894	.877	.898	.880	.894	.886	.860	.872	.904	.879	.920	.894	.933	.892	.943	.875
λ = .5																																									
	2	.724	.863	.701	.894	.566	.919	.382	.915	.519	.525	.554	.749	.534	.936	.499	.918	.810	.911	.784	.912	.650	.918	.484	.895	.714	.904	.672	.915	.425	.910	.288	.892	.833	.911	.806	.926	.668	.916	.505	.896
	3	.797	.892	.790	.903	.717	.906	.596	.910	.825	.863	.840	.888	.799	.907	.735	.892	.906	.906	.916	.910	.921	.891	.903	.874	.907	.902	.913	.905	.910	.894	.903	.871	.881	.906	.889	.905	.865	.894	.819	.883
	4	.832	.887	.838	.903	.803	.905	.732	.881	.891	.885	.904	.901	.909	.892	.899	.882	.875	.887	.896	.902	.920	.896	.911	.868	.855	.891	.841	.895	.746	.894	.651	.859	.875	.880	.891	.896	.887	.881	.848	.873
	5	.849	.883	.865	.898	.852	.902	.802	.883	.907	.894	.919	.894	.925	.888	.918	.872	.892	.885	.908	.877	.924	.882	.925	.850	.861	.883	.850	.888	.771	.876	.677	.855	.904	.901	.919	.896	.931	.879	.926	.864
	6	.879	.892	.889	.897	.889	.886	.865	.864	.891	.881	.905	.897	.890	.880	.873	.865	.858	.867	.883	.883	.898	.877	.879	.862	.885	.872	.911	.880	.903	.883	.879	.847	.900	.886	.925	.894	.940	.881	.940	.856
	7	.884	.877	.904	.900	.909	.889	.900	.865	.888	.879	.890	.897	.856	.878	.811	.856	.883	.857	.903	.879	.920	.881	.917	.852	.882	.867	.898	.880	.864	.871	.819	.849	.898	.875	.920	.884	.932	.864	.951	.850
λ = .6																																									
	2	.714	.879	.692	.885	.531	.907	.322	.911	.493	.500	.515	.683	.495	.926	.461	.944	.765	.898	.746	.901	.549	.909	.355	.888	.624	.906	.525	.915	.271	.901	.134	.891	.793	.909	.735	.914	.517	.897	.306	.881
	3	.775	.874	.767	.898	.686	.901	.537	.898	.774	.841	.784	.875	.698	.897	.612	.888	.899	.892	.901	.897	.895	.871	.859	.847	.896	.897	.898	.893	.900	.885	.877	.848	.859	.908	.864	.913	.803	.894	.723	.866
	4	.822	.882	.834	.890	.779	.899	.660	.865	.876	.885	.880	.899	.867	.894	.820	.868	.874	.883	.895	.893	.897	.881	.884	.853	.830	.906	.796	.896	.672	.876	.525	.851	.872	.882	.874	.887	.855	.881	.792	.851
	5	.857	.890	.864	.886	.835	.888	.771	.862	.897	.881	.911	.893	.900	.874	.895	.853	.889	.883	.896	.892	.919	.868	.912	.839	.831	.874	.815	.870	.712	.867	.600	.833	.906	.891	.923	.881	.921	.876	.917	.831
	6	.864	.888	.893	.886	.880	.879	.849	.853	.888	.886	.898	.890	.885	.879	.845	.844	.858	.865	.881	.877	.887	.866	.874	.835	.896	.888	.898	.879	.890	.861	.848	.827	.904	.876	.920	.882	.934	.857	.941	.828
	7	.878	.876	.892	.890	.898	.885	.886	.850	.867	.877	.871	.882	.828	.865	.735	.827	.870	.863	.905	.868	.914	.853	.914	.834	.877	.872	.883	.878	.847	.855	.773	.821	.910	.870	.921	.873	.939	.853	.936	.828
λ = .7																																									
	2	.708	.896	.669	.902	.493	.906	.252	.902	.474	.479	.485	.615	.457	.869	.433	.936	.728	.903	.671	.900	.429	.897	.213	.883	.467	.907	.351	.905	.128	.895	.035	.883	.720	.905	.639	.912	.333	.893	.117	.881
	3	.772	.888	.776	.886	.644	.892	.469	.880	.701	.861	.690	.879	.554	.900	.441	.884	.886	.894	.888	.892	.833	.869	.784	.835	.895	.897	.896	.891	.874	.870	.819	.836	.833	.900	.824	.904	.727	.887	.605	.851
	4	.821	.887	.817	.891	.745	.894	.627	.868	.830	.903	.829	.904	.770	.885	.660	.864	.872	.884	.903	.874	.885	.869	.868	.823	.788	.891	.749	.888	.571	.858	.402	.830	.844	.883	.862	.891	.811	.867	.729	.846
	5	.851	.882	.869	.890	.822	.878	.750	.847	.883	.893	.892	.897	.865	.872	.830	.834	.872	.878	.903	.883	.910	.859	.896	.825	.809	.878	.781	.878	.640	.862	.507	.818	.888	.891	.908	.874	.901	.857	.885	.814
	6	.871	.888	.892	.885	.876	.861	.839	.842	.884	.887	.894	.895	.852	.862	.810	.834	.865	.872	.875	.878	.885	.854	.855	.816	.877	.879	.886	.874	.871	.859	.842	.818	.896	.888	.924	.863	.919	.848	.922	.805
	7	.880	.876	.893	.879	.892	.856	.880	.824	.864	.875	.851	.876	.784	.847	.694	.822	.879	.871	.903	.871	.916	.840	.902	.814	.867	.873	.869	.873	.816	.843	.731	.799	.886	.866	.920	.865	.929	.836	.936	.789
ϕ = .3																																									
	2	.802	.782	.859	.857	.919	.921	.890	.917	.743	.291	.783	.593	.898	.790	.929	.854	.880	.848	.927	.896	.932	.924	.941	.936	.905	.875	.903	.882	.940	.927	.943	.931	.918	.890	.915	.903	.934	.919	.936	.933
	3	.851	.791	.884	.871	.918	.924	.923	.928	.882	.809	.900	.872	.920	.919	.932	.936	.908	.896	.903	.892	.926	.915	.950	.936	.910	.893	.924	.907	.937	.932	.929	.929	.892	.871	.928	.913	.923	.914	.935	.929
	4	.882	.853	.901	.890	.942	.921	.943	.934	.911	.868	.928	.894	.923	.912	.918	.924	.906	.882	.918	.907	.944	.927	.952	.926	.901	.880	.927	.905	.935	.922	.934	.927	.902	.872	.926	.883	.946	.933	.943	.912
	5	.905	.861	.931	.897	.944	.921	.936	.931	.913	.870	.909	.876	.919	.907	.935	.928	.927	.871	.922	.898	.944	.939	.947	.927	.909	.863	.926	.892	.927	.917	.924	.910	.910	.873	.923	.898	.956	.926	.931	.908
	6	.908	.869	.920	.879	.948	.914	.933	.921	.928	.878	.933	.902	.936	.923	.933	.930	.908	.820	.919	.864	.946	.927	.953	.920	.905	.840	.927	.887	.929	.901	.939	.913	.907	.850	.944	.905	.946	.911	.950	.930
	7	.907	.857	.918	.889	.935	.926	.946	.926	.913	.872	.922	.874	.939	.914	.935	.926	.915	.841	.923	.874	.949	.924	.943	.923	.920	.849	.928	.868	.935	.917	.947	.922	.910	.832	.931	.884	.947	.911	.941	.912

Note. Mod. Asym = Moderate Asymmetry; Mod. Asym-Alt = Moderate Asymmetry-Alternating; Ext. Asym = Exteme Asymmetry; Ext. Asym-Alt = Extreme Asymmetry-Alternating. ML = robust normal-theory maximum likelihood; ULS = robust categorical least squares.

Type-I Error Rates, Underlying Distribution = Normal

			Ext. Asym.								Ext. Asym.-Alt.								Mod. Asym.								Mod. Asym.-Alt.								Symmetric							
			N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600	
Model	Imp.	cats	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS
1																																										
	Imp. Excl.																																									
		2	.019	.011	.034	.024	.047	.040	.045	.055	.022	.009	.035	.034	.073	.053	.113	.060	.051	.025	.058	.035	.054	.046	.063	.061	.051	.033	.055	.039	.046	.035	.047	.046	.054	.020	.060	.039	.052	.037	.055	.055
		3	.047	.045	.034	.042	.058	.050	.053	.049	.045	.055	.056	.059	.070	.034	.093	.052	.045	.038	.066	.055	.051	.039	.059	.049	.058	.030	.066	.048	.052	.039	.059	.059	.055	.023	.048	.033	.058	.044	.048	.039
		4	.046	.031	.049	.056	.046	.045	.054	.057	.058	.051	.041	.052	.064	.053	.067	.049	.046	.047	.054	.065	.042	.060	.060	.062	.060	.060	.055	.054	.054	.043	.054	.046	.072	.051	.055	.046	.041	.045	.048	.043
		5	.051	.045	.058	.057	.051	.058	.055	.059	.057	.056	.058	.053	.069	.058	.062	.055	.062	.080	.064	.072	.052	.057	.060	.069	.050	.070	.069	.080	.041	.041	.052	.054	.058	.067	.069	.070	.060	.065	.063	.056
		6	.048	.053	.050	.072	.057	.052	.069	.062	.059	.068	.062	.070	.072	.072	.057	.055	.050	.093	.062	.085	.050	.074	.055	.063	.063	.082	.060	.079	.057	.057	.046	.052	.055	.091	.052	.068	.053	.061	.055	.055
		7	.053	.079	.056	.072	.046	.061	.062	.058	.061	.081	.059	.075	.052	.056	.055	.045	.048	.097	.066	.090	.049	.078	.068	.067	.053	.095	.050	.077	.055	.063	.055	.060	.065	.127	.054	.092	.046	.061	.064	.073
	Imp. Rej.																																									
		2	.445	.468	.235	.346	.057	.091	.045	.064	.375	.364	.195	.260	.084	.133	.113	.082	.171	.195	.088	.106	.054	.051	.063	.061	.148	.219	.084	.113	.047	.041	.047	.048	.135	.165	.083	.112	.053	.038	.055	.055
		3	.186	.208	.081	.121	.059	.054	.053	.049	.154	.296	.083	.168	.071	.040	.093	.052	.076	.080	.073	.070	.051	.039	.059	.049	.081	.066	.069	.052	.052	.039	.059	.059	.086	.068	.053	.055	.058	.044	.048	.039
		4	.113	.116	.063	.074	.046	.045	.054	.057	.127	.142	.051	.091	.064	.055	.067	.049	.077	.083	.059	.073	.042	.060	.060	.062	.091	.097	.061	.065	.054	.043	.054	.046	.092	.069	.057	.047	.041	.045	.048	.043
		5	.094	.086	.069	.072	.051	.058	.055	.059	.098	.114	.063	.063	.069	.058	.062	.055	.080	.091	.066	.076	.052	.057	.060	.069	.074	.097	.071	.084	.041	.041	.053	.054	.074	.086	.074	.076	.060	.065	.064	.056
		6	.080	.083	.055	.076	.057	.052	.069	.062	.090	.102	.066	.076	.072	.072	.057	.055	.075	.111	.064	.087	.050	.074	.055	.063	.083	.099	.061	.080	.057	.057	.046	.052	.072	.103	.053	.069	.053	.061	.055	.055
		7	.078	.104	.062	.077	.046	.061	.063	.058	.086	.100	.061	.081	.052	.056	.055	.045	.067	.107	.070	.092	.049	.078	.068	.067	.075	.109	.056	.080	.055	.063	.055	.060	.081	.140	.056	.093	.046	.061	.065	.073
2																																										
	Imp. Excl.																																									
		2	.078	.002	.044	.011	.038	.027	.041	.044	.074	.001	.088	.010	.180	.047	.401	.063	.090	.016	.064	.015	.055	.024	.059	.040	.065	.005	.064	.016	.049	.029	.063	.048	.092	.012	.056	.013	.058	.028	.051	.037
		3	.103	.031	.056	.024	.039	.032	.050	.042	.077	.053	.088	.043	.179	.052	.334	.045	.082	.010	.051	.017	.047	.028	.044	.040	.091	.021	.052	.014	.050	.037	.045	.039	.064	.005	.048	.017	.046	.027	.045	.032
		4	.084	.022	.062	.035	.061	.037	.044	.036	.097	.030	.078	.037	.106	.038	.182	.039	.079	.038	.058	.041	.051	.054	.039	.036	.066	.040	.041	.036	.048	.046	.062	.062	.075	.019	.069	.031	.045	.041	.043	.039
		5	.069	.036	.055	.033	.038	.029	.047	.037	.088	.041	.073	.049	.094	.041	.129	.039	.070	.082	.055	.072	.041	.054	.036	.036	.062	.058	.053	.064	.043	.051	.042	.041	.053	.049	.049	.037	.042	.039	.054	.043
		6	.084	.049	.062	.049	.059	.054	.051	.048	.110	.059	.064	.048	.074	.052	.111	.054	.069	.088	.060	.092	.046	.067	.031	.053	.065	.096	.053	.064	.034	.065	.046	.062	.086	.079	.053	.055	.049	.062	.051	.047
		7	.075	.079	.060	.060	.049	.051	.038	.039	.076	.087	.055	.054	.065	.053	.104	.062	.079	.098	.052	.071	.048	.065	.038	.066	.058	.091	.061	.097	.057	.078	.039	.070	.072	.121	.047	.095	.044	.070	.053	.060
	Imp. Rej.																																									
		2	.106	.120	.046	.043	.038	.027	.041	.044	.086	.039	.090	.014	.181	.048	.401	.063	.091	.026	.065	.016	.055	.024	.059	.040	.066	.028	.065	.017	.049	.029	.064	.048	.093	.016	.056	.014	.059	.028	.051	.037
		3	.104	.038	.057	.026	.039	.032	.050	.042	.078	.143	.088	.053	.180	.052	.334	.045	.082	.010	.051	.017	.047	.028	.045	.040	.091	.021	.052	.014	.050	.037	.046	.039	.064	.005	.048	.017	.046	.027	.046	.032
		4	.084	.022	.062	.035	.061	.037	.044	.036	.097	.032	.078	.037	.106	.038	.183	.039	.080	.038	.058	.041	.051	.054	.039	.036	.066	.040	.041	.036	.049	.046	.062	.062	.075	.019	.069	.031	.045	.041	.045	.039
		5	.069	.036	.055	.033	.038	.029	.047	.037	.088	.041	.073	.049	.095	.041	.130	.039	.070	.082	.055	.072	.041	.054	.036	.036	.063	.058	.053	.064	.043	.051	.042	.041	.053	.049	.049	.037	.043	.039	.054	.043
		6	.084	.049	.062	.049	.059	.054	.052	.048	.110	.060	.064	.048	.074	.052	.113	.054	.069	.088	.060	.092	.046	.067	.031	.053	.065	.096	.053	.064	.034	.065	.046	.062	.087	.079	.053	.055	.049	.062	.051	.047
		7	.075	.079	.060	.060	.049	.051	.039	.039	.076	.087	.055	.054	.066	.053	.105	.062	.079	.098	.052	.071	.048	.065	.039	.066	.058	.091	.061	.097	.057	.078	.040	.070	.072	.121	.047	.095	.045	.070	.054	.060

Note. "Imp. Excl" refers to results when nonconvergences and improper solutions were excluded before computing Type-I error rates. "Imp. Rej." refers to results when nonconvergences and improper solutions were counted as model rejections. Mod. Asym = Moderate Asymmetry; Mod. Asym-Alt = Moderate Asymmetry-Alternating; Ext. Asym = Exteme Asymmetry; Ext. Asym-Alt = Extreme Asymmetry-Alternating. ML = robust normal-theory maximum likelihood; ULS = robust categorical least squares.

Type-I Error Rates, Underlying Distribution = Skew 2, Kurtosis 7

		ext.asym								ext.opp								mod.asym								mod.opp								symmetric							
		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600		N = 100		N = 150		N = 350		N = 600	
Model	cats	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS	ML	ULS
1																																							
Imp. Excl.																																							
	2	.014	.002	.038	.025	.038	.060	.038	.051	.018	.012	.010	.007	.056	.010	.121	.030	.047	.025	.054	.042	.045	.043	.054	.041	.054	.041	.058	.032	.068	.050	.056	.045	.061	.041	.063	.038	.051	.040	.068	.049
	3	.044	.090	.046	.063	.039	.049	.049	.052	.060	.131	.063	.077	.081	.061	.155	.044	.069	.031	.075	.047	.054	.036	.045	.045	.057	.039	.055	.039	.040	.047	.060	.055	.050	.014	.054	.035	.042	.034	.039	.040
	4	.043	.050	.055	.064	.056	.049	.050	.042	.046	.059	.059	.048	.076	.060	.079	.036	.056	.069	.072	.078	.042	.049	.050	.057	.057	.047	.050	.043	.044	.047	.061	.054	.055	.081	.060	.064	.050	.054	.064	.061
	5	.055	.076	.066	.068	.053	.059	.047	.053	.053	.059	.057	.074	.068	.060	.081	.068	.049	.071	.052	.066	.063	.062	.056	.056	.059	.071	.049	.062	.052	.049	.040	.047	.067	.058	.073	.077	.056	.062	.052	.060
	6	.060	.089	.065	.086	.054	.061	.052	.063	.072	.077	.055	.054	.058	.064	.049	.051	.045	.110	.057	.098	.046	.049	.047	.052	.060	.092	.050	.072	.058	.069	.055	.062	.056	.062	.061	.062	.054	.047	.047	.052
	7	.061	.104	.072	.086	.058	.062	.046	.065	.054	.089	.060	.069	.057	.069	.059	.066	.050	.136	.054	.119	.053	.075	.053	.071	.056	.097	.061	.084	.047	.069	.041	.077	.059	.102	.057	.096	.052	.064	.057	.059
Imp. Rej.																																							
	2	.425	.489	.256	.329	.048	.117	.038	.062	.619	.672	.410	.439	.126	.081	.127	.055	.182	.247	.080	.137	.045	.053	.054	.041	.127	.219	.072	.119	.068	.056	.056	.046	.104	.173	.071	.083	.051	.047	.069	.049
	3	.258	.406	.103	.180	.039	.063	.049	.052	.151	.507	.084	.278	.081	.077	.155	.044	.091	.076	.078	.056	.054	.036	.045	.045	.079	.084	.058	.046	.040	.047	.060	.055	.075	.080	.057	.061	.042	.034	.039	.040
	4	.160	.190	.078	.110	.056	.051	.050	.042	.081	.171	.064	.069	.076	.063	.079	.036	.089	.109	.076	.087	.042	.049	.050	.057	.077	.084	.051	.049	.044	.047	.062	.054	.086	.132	.067	.082	.050	.054	.064	.061
	5	.117	.149	.072	.085	.053	.060	.047	.053	.073	.117	.060	.090	.068	.060	.081	.068	.070	.094	.053	.072	.063	.062	.056	.056	.074	.089	.051	.069	.052	.049	.040	.047	.077	.086	.077	.082	.056	.062	.052	.060
	6	.112	.135	.073	.102	.054	.061	.052	.063	.089	.103	.059	.063	.058	.064	.049	.051	.086	.138	.062	.106	.046	.049	.047	.052	.088	.117	.052	.077	.058	.069	.055	.062	.065	.081	.061	.065	.054	.047	.047	.052
	7	.103	.139	.078	.092	.058	.062	.046	.065	.071	.115	.063	.074	.057	.069	.060	.066	.086	.156	.058	.123	.053	.075	.053	.071	.067	.112	.062	.089	.047	.069	.042	.077	.068	.107	.058	.099	.052	.064	.057	.059
2																																							
Imp. Excl.																																							
	2	.086	.000	.052	.003	.037	.038	.043	.049	.054	.000	.064	.007	.251	.000	.571	.020	.084	.017	.052	.011	.052	.025	.048	.029	.075	.009	.067	.018	.055	.031	.064	.036	.078	.010	.063	.018	.049	.030	.057	.043
	3	.090	.218	.054	.062	.048	.036	.043	.025	.098	.258	.118	.083	.305	.049	.602	.045	.081	.011	.055	.016	.035	.030	.049	.038	.065	.008	.055	.017	.062	.033	.043	.030	.057	.000	.055	.006	.043	.020	.051	.034
	4	.091	.047	.059	.026	.043	.048	.047	.046	.104	.061	.090	.050	.182	.044	.328	.053	.073	.054	.053	.050	.045	.047	.040	.038	.061	.017	.057	.030	.051	.041	.056	.043	.093	.044	.059	.054	.051	.059	.040	.048
	5	.065	.047	.045	.040	.042	.038	.049	.043	.088	.059	.071	.053	.091	.046	.175	.057	.063	.059	.054	.053	.046	.060	.037	.047	.062	.048	.048	.039	.050	.048	.035	.059	.075	.050	.058	.054	.042	.054	.040	.053
	6	.098	.081	.052	.055	.050	.050	.037	.043	.073	.048	.061	.055	.079	.052	.117	.057	.081	.143	.057	.088	.037	.063	.031	.057	.068	.070	.046	.065	.033	.053	.054	.055	.092	.052	.044	.041	.040	.058	.041	.060
	7	.076	.088	.066	.068	.047	.064	.039	.048	.080	.087	.074	.072	.051	.065	.090	.070	.078	.202	.060	.134	.038	.074	.047	.088	.069	.098	.054	.094	.043	.081	.045	.084	.067	.094	.047	.082	.053	.065	.044	.068
Imp. Rej.																																							
	2	.127	.173	.054	.060	.037	.040	.044	.049	.300	.515	.113	.097	.251	.000	.571	.020	.084	.043	.052	.013	.052	.025	.048	.029	.075	.040	.068	.022	.056	.031	.065	.036	.078	.018	.063	.019	.050	.030	.057	.043
	3	.091	.270	.054	.067	.048	.036	.045	.025	.099	.442	.119	.148	.305	.049	.602	.045	.081	.013	.055	.016	.035	.030	.050	.038	.065	.009	.055	.017	.062	.033	.043	.030	.057	.002	.056	.006	.043	.020	.052	.034
	4	.094	.053	.060	.027	.043	.048	.047	.046	.104	.069	.090	.050	.182	.044	.329	.053	.073	.054	.054	.050	.045	.047	.041	.038	.061	.017	.058	.030	.051	.041	.056	.043	.093	.045	.059	.054	.052	.059	.041	.048
	5	.066	.047	.045	.040	.043	.038	.049	.043	.088	.059	.071	.054	.092	.046	.175	.057	.063	.059	.054	.053	.046	.060	.038	.047	.062	.048	.048	.039	.050	.048	.036	.059	.075	.050	.059	.054	.042	.054	.040	.053
	6	.098	.081	.052	.055	.050	.050	.037	.043	.073	.048	.061	.055	.080	.052	.117	.057	.081	.143	.057	.088	.037	.063	.031	.057	.068	.070	.046	.065	.034	.053	.054	.055	.092	.052	.044	.041	.041	.058	.043	.060
	7	.077	.088	.066	.068	.047	.064	.039	.048	.080	.088	.074	.072	.051	.065	.090	.070	.078	.202	.060	.134	.040	.074	.047	.088	.069	.098	.054	.094	.043	.081	.045	.084	.067	.094	.047	.082	.054	.065	.044	.068

Note. "Imp. Excl" refers to results when nonconvergences and improper solutions were excluded before computing Type-I error rates. "Imp. Rej." refers to results when nonconvergences and improper solutions were counted as model rejections. Mod. Asym = Moderate Asymmetry; Mod. Asym-Alt = Moderate Asymmetry-Alternating; Ext. Asym = Exteme Asymmetry; Ext. Asym-Alt = Extreme Asymmetry-Alternating. ML = robust normal-theory maximum likelihood; ULS = robust categorical least squares.