Errata

Items with asterisks will still be in the Second Printing

Author website URL: http://cehs.unl.edu/EdPsych/RJSite/home.

***P7**. "The square root of σ_E^2 (i.e., σ_E) is referred to…" not "The square root of σ_E^2 (i.e., σ_E)is referred to…"

***P28**. "A narrow interval indicates comparatively less **un**certainty about a …" not "A narrow interval indicates comparatively less certainty about a …"

***P28**. There are two equations listed as 2.11. The second 2.11 equation should be labeled 2.12.

***P28**. Equation 2.13 should be $(1-\alpha)\%CB: \hat{\theta} \pm z_{(1-\alpha/2)}\sigma_e(\hat{\theta})$

P64. To summarize our analyses, the nonlinear factor analysis provided support that a uni-dimensional model of the data is a reasonable **representation [ ] the data**. [of] is missing

***P70.** In Equation 4.6 $g(\theta \mid \underline{\vartheta})$ should be $g(\theta \mid \underline{\nu})$

***P73**. Equation 4.7 should be $\frac{\partial}{\partial \delta_j} \ln L = -\sum_r^R \sum_i^N \left\{ \left[x_{ij} - p_j(\mathrm{X}_r) \right] \left[p_j(\mathrm{X}_r \mid \underline{\mathbf{x}}_i, \underline{\vartheta}, \underline{\nu}) \right] \right\} = 0$.

Equation 4.9 should be

$$\frac{\partial}{\partial \delta_j} \ln L = -\sum_r^R \sum_i^N \left\{ \left[x_{ij} * p_j(\mathrm{X}_r \mid \underline{\mathbf{x}}_i, \underline{\vartheta}, \underline{\nu})) \right] - \left[p_j(\mathrm{X}_r) * p_j(\mathrm{X}_r \mid \underline{\mathbf{x}}_i, \underline{\vartheta}, \underline{\nu}) \right] \right\} = 0 .$$

Equation 4.10 should be

$$\frac{\partial}{\partial \delta_j} \ln L = -\sum_r^R \left\{ \left[\sum_i^N x_{ij} * p_j(\mathrm{X}_r \mid \underline{\mathbf{x}}_i, \underline{\vartheta}, \underline{\nu}) \right] - \left[p_j(\mathrm{X}_r) \sum_i^N p_j(\mathrm{X}_r \mid \underline{\mathbf{x}}_i, \underline{\vartheta}, \underline{\nu}) \right] \right\} = 0 .$$

Equation 4.11. $p \rightarrow p_j$ & $\bar{\mathrm{n}}_{rj} = \sum^N p_j(X_r \mid \underline{x}_i, \underline{\vartheta}, \underline{\nu})$

P79. Table 4.1. $PSD\left(\hat{\theta}\right)=\frac{0.0624150}{0.1174369}=0.7290 \rightarrow PSD\left(\hat{\theta}\right)=\sqrt{\frac{0.0624150}{0.1174369}}=0.7290$

***P86**. Line 1: Should read: $A(X_1) = 0.7648E\text{-}04 = 0.00007648$

***P86**. Line 17: "$\alpha_j\sqrt{1+\alpha_j^2}$ " should be $\alpha_j \Big/ \sqrt{1+\alpha_j^2}$

***P90**. Line 6: `IFNAME='C:\MATHRSCH.dat'` should be `IFNAME='C:\MATHRSCH.PAR'`

P92. (just below Equation 4.17). ξ^* is the δ_j^* (or θ) is the δ_j on the target metric → ξ^* is the δ_j^* (or θ^*) is the target metric.

***P93**. Equation 4.21 should read $\kappa = \bar{\delta}^* - \zeta\ \bar{\delta}$

P100. (just above Figure 5.1). $p\left(x=1\,|\,\theta,\alpha_j,\delta_j\right)\rightarrow p\left(x_j=1\,|\,\theta,\alpha_j,\delta_j\right)$

***P120**. Equation 5.15. $p_j^{'}=\alpha_j\frac{e^{\alpha_j(\theta-\delta_j)}}{\left(1+e^{\alpha_j(\theta-\delta_j)}\right)\left(1+e^{\alpha_j(\theta-\delta_j)}\right)}=\alpha_j\frac{e^{\alpha_j(\theta-\delta_j)}}{\left[1+e^{\alpha_j(\theta-\delta_j)}\right]^2}$

P141. $R_\Delta^2=\frac{110774.295-110397.103}{110774.295}=0.003\rightarrow R_\Delta^2=\frac{110397.103\text{-}110064.929}{110397.103}=0.003$

P143. Equation 6.8. There is no closing parenthesis or the opening parenthesis may need to be removed.

P160. The last line. Equation 6.21 →Equation 6.22

***P160**. Equation 6.22 should read: $w_j(\theta)=\frac{\alpha_j(p_j-\chi_j)}{p_j(1-\chi_j)}=\frac{\alpha_j}{1+\chi_j e^{-\alpha_j(\theta-\delta_j)}}$

P165. $\frac{e^{(\theta-\delta_2)}}{\theta}\rightarrow\frac{e^{(\theta-\delta_2)}}{\varphi}$

***P165**. Second paragraph, last sentence should read "The probability of both of these is given by adding the (mutually exclusive) events of 0 and 1, that is, $e^{0+(\theta-\delta_1)}$.

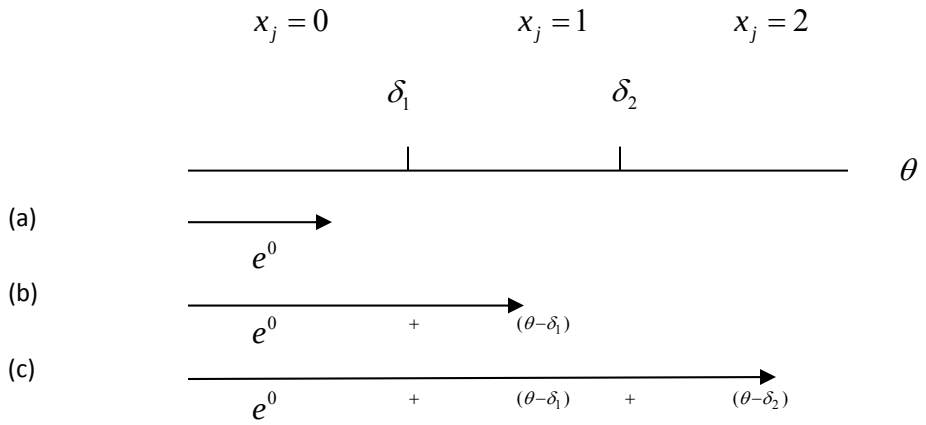
***P165**. Third paragraph, fourth and fifth sentences should read "Therefore, to obtain an $x_j = 2$ the individual passes through $x_j = 0$ (i.e., e^0), passes through $x_j = 1$ (i.e., $e^{0+(\theta-\delta_1)}$), *and* then passes through the second transition point (i.e., $e^{0+(\theta-\delta_1)+(\theta-\delta_2)}$). Therefore, the probability of $x_j = 2$ is given by $e^{0+(\theta-\delta_1)+(\theta-\delta_2)}$.

***P165**. Fourth paragraph, first sentence should read "When each of the three terms (i.e., $x_j = 0$: e^0, $x_j = 1$: $e^{0+(\theta-\delta_1)}$, $x_j = 2$: $e^{0+(\theta-\delta_1)+(\theta-\delta_2)}$) is …"

***P165**. Figure 7.1:

panel a: e^0 panel b: $e^{0+(\theta-\delta_1)}$ panel c: $e^{0+(\theta-\delta_1)+(\theta-\delta_2)}$

Therefore, Figure 7.1 should appear as:



***P171**. Table 7.1 'NEXAMINEES=3000' should be 'NEXAMINEES=2942'

***P180**. "For example, let τ_1, τ_2, τ_3 have the values of -0.8, -0.2, and 0.5, respectively, and let …" should be "For example, let τ_1, τ_2, τ_3 have the values of -0.8, -0.2, and 1.0, respectively, and let …"

P177. The last paragraph. There is no A, B, and C in Figure 7.7. Figure 7.7A, Figure 7.7B, and Figure 7.7C correspond to the top, middle, and bottom graphs, respectively.

P197. 12th line from the bottom. 1.3 logit → 2.1 logit (-90 – 1.26 = - 2.16). 4th line from the bottom. "strongly agree" →"strongly disagree"

P199. 19th line from the top. 22 respondents. → 45 respondents (180 people/4 categories=45)

***P210**. First full paragraph, first sentence: "… an item δ_{jk} s …" should be "… an item δ_{jh} s …" and in the last sentence of this paragraph"… substituting $\delta_{jk} = \delta_j - \tau_k$ …" should be "… substituting $\delta_{jh} = \delta_j - \tau_h$ …"

P212. Figure 8.2 α s should be α_2.

P225. 14th line from the top. the approximate range of -1.57 to 1.23 $\rightarrow$ the approximate range of -1.88 to 1.23 (item 6's $\hat{\delta}_{j1} = -1.88$)

***P231**. Equation 8.8 should be: $I_{x_j}(\theta) = \dfrac{\left\{p'_{x_j}\right\}^2}{p_{x_j}} = \dfrac{\left[P^{*'}_{x_j} - P^{*'}_{x_{j+1}}\right]^2}{P^{*}_{x_j} - P^{*}_{x_{j+1}}}$

***P231**. The first equation after "so that" in the bottom half of this page should be:

$$p'_0 = [P^{*'}_0 - P^{*'}_1] = 0 - \alpha_j \left(\frac{e^{\alpha_j(\theta-\delta_1)}}{\varphi_1} \right) = -\alpha_j \left(\frac{e^{\alpha_j(\theta-\delta_1)}}{\varphi_1} \right)$$

***P232**. The first equation should be:

$$p'_1 = [P^{*'}_1 - P^{*'}_2] = \alpha_j \left(\frac{e^{\alpha_j(\theta-\delta_1)}}{\varphi_1} \right) - \alpha_j \left(\frac{e^{\alpha_j(\theta-\delta_2)}}{\varphi_2} \right)$$

$$= \alpha_j \left[\left(\frac{e^{\alpha_j(\theta-\delta_1)}}{\varphi_1} \right) - \left(\frac{e^{\alpha_j(\theta-\delta_2)}}{\varphi_2} \right) \right]$$

P234. Equation 8.10. $x_k \rightarrow x_{jk}$

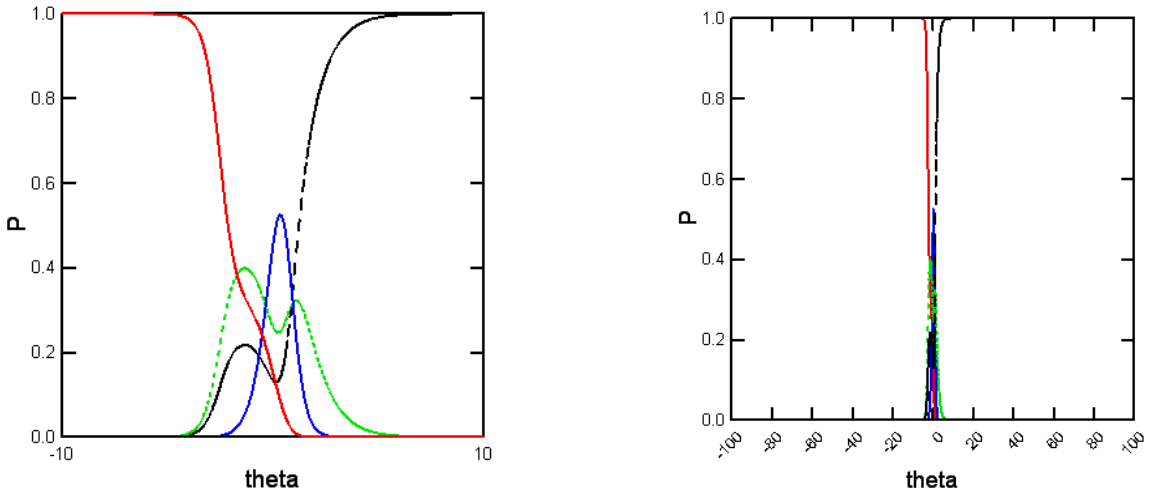
P250. The clause after the semicolon should read:
" in this case the corresponding HIGH category identification does not need to be changed (i.e., HIGH=(2,3,4,3))."

***P251**. Last line of the paragraph that continues from p. 250: "..; we use the 2ln*L* value below." should read "..; we use the -2ln*L* value below."

***P266**. First full paragraph, line 5: ".. the difference chi-square is 288.4 - 259.73 = 29.1" should read ".. the difference chi-square is 288.4-259.3 = 29.1"

***P266**. Second to last sentence in the first full paragraph: "With a critical X^2 of …" should be "With a critical X^2 of …" (i.e., chi square is not italicized)

***P268**. Item 4's ORFs for the theta range -10 to 10 (left panel) and -100 to 100 (right panel)



P279. 9th line from the bottom. According to Figure 10.3, the rightmost line is related to $p_j = 0.95$ instead of $p_j = 0.90$

P294. $\gamma_j^* = \gamma_j \dfrac{\alpha_j(\kappa)}{\zeta} \rightarrow \gamma_j^* = \gamma_j - \dfrac{\alpha_j(\kappa)}{\zeta}$

***P296**. Table 10.1's Note should read "Name=intrprsnl.inp"

***P313**. Equation 11.6 should read $\kappa = \bar{\delta}^* - \zeta\ \bar{\delta}$

***P320**. Table 11.3: The initial value of the K should be 0.20 not 0.10. Therefore,

```
INITIAL VALUE FOR A=    0.8000  INITIAL VALUE FOR K=    0.1000
```

should be

```
INITIAL VALUE FOR A=    0.8000  INITIAL VALUE FOR K=    0.2000
```

***P331**. The TSW ΔG^2 DIF approach can be performed using either MULTILOG or IRTLRDIF (Thissen, D. (2001). *IRTLRDIF v2.0b: Software for the computation of the statistics involved in item response theory likelihood-ratio tests for differential item functioning* [Computer software and manual]. Chapel Hill: L.L. Thurstone Psychometric Laboratory, University of North Carolina.)

***P338.** The ΔG^2 should read 41.407 not 44.407.

***P338.** The estimated full model should be:

$$z_3 = -1.3330 + 0.1371 * X + 0.7714 * RACE - 0.1171(X * RACE)$$

***P338.** The estimated reduced model (1) should be:

$$z_3 = 0.5558 + 0.0481 * X - 1.9577 * RACE$$

***P339.** Table 12.4 should read:

```
/* Full Model */

                                The LOGISTIC Procedure
:
                                 Model Fit Statistics
                                                        Intercept
                                           Intercept            and
                                Criterion          Only     Covariates
                                AIC             2568.331       2225.517
                                SC              2573.947       2247.980
                                -2 Log L        2566.331       2217.517

                               Testing Global Null Hypothesis: BETA=0
                          Test                 Chi-Square       DF     Pr > ChiSq
                          Likelihood Ratio       348.8144        3         <.0001
                          Score                  302.5715        3         <.0001
                          Wald                   238.7854        3         <.0001


                                    The LOGISTIC Procedure
                          Analysis of Maximum Likelihood Estimates
                                                 Standard          Wald
                     Parameter    DF    Estimate       Error    Chi-Square    Pr > ChiSq
                     Intercept     1     -1.3330      0.3626       13.5133        0.0002
                     X             1      0.1371     0.00860        5.3560        0.0207
                     RACE          1      0.7714      0.4484        2.9596        0.0854
                     X*RACE        1     -0.1171      0.0193       36.9106        <.0001
:
/* reduce model (1)/"full" model */
```

:

Model Fit Statistics

Criterion	Intercept Only	Intercept and Covariates
AIC	2568.331	2264.923
SC	2573.947	2281.771
-2 Log L	2566.331	2258.923

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	307.4075	2	<.0001
Score	292.7168	2	<.0001
Wald	262.7802	2	<.0001

Analysis of Maximum Likelihood Estimates

Parameter	DF	Estimate	Standard Error	Wald Chi-Square	Pr > ChiSq
Intercept	1	0.5558	0.1880	8.7427	0.0031
X	1	0.0481	0.00749	41.2621	<.0001
RACE	1	-1.9577	0.1211	261.3266	<.0001

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
X	1.049	1.034	1.065
RACE	0.141	0.111	0.179

***P340.** The second to the last sentence in the paragraph should read: "Given our coding of the RACE variable if $\hat{\tau}_2 < 0$, then the item favors the focal group. In contrast, if $\hat{\tau}_2 > 0$ then the item favors the reference group.[6]"

***P340.** Table 12.5 should read:

```
/* reduce model (2) */
```

:

Model Fit Statistics

Criterion	Intercept Only	Intercept and Covariates
AIC	2568.331	2569.709
SC	2573.947	2580.941
-2 Log L	2566.331	**2565.709**

Testing Global Null Hypothesis: BETA=0

Test	Chi-Square	DF	Pr > ChiSq
Likelihood Ratio	0.6217	1	0.4304
Score	0.6223	1	0.4302
Wald	0.6221	1	0.4303

Analysis of Maximum Likelihood Estimates

			Standard	Wald

Parameter	DF	Estimate	Error	Chi-Square	Pr > ChiSq
Intercept	1	0.8521	0.1727	24.3530	<.0001
X	1	-0.00488	0.00619	0.6221	0.4303

Odds Ratio Estimates

Effect	Point Estimate	95% Wald Confidence Limits	
X	0.995	0.983	1.007

***P345.** Endnote 6. Reduced model (1): should be

$$z_3 = 0.5558 + 0.0481 * X - 1.9577 * RACE$$

and the corresponding text should read:

> "Therefore, holding the observed score fixed and switching from the focal group to the reference group results in a decrease in the log odds of obtaining a response of 1 by 1.9577. In terms of odds we have that the odds that a reference group member will produce a response of 1 are exp(-1.9577)= 0.1412 to 1 (note: 0.141 is the value listed as the `Point Estimate` in the `Odds Ratio Estimates` section). Alternatively, holding the observed score fixed, one expects the odds of focal group members to correctly respond to the item to be roughly 7 to 1 (i.e., 1/0.1412 = 7.0830) relative to comparable reference group members."

P356. 16th line from the top. if $q_j = 0$, then $\delta = \infty$, and if $q_j = N$, then $\delta = -\infty$

P357. **First Equation**: negative sign in from of q_j:

$$\frac{\partial}{\partial \delta} \ln L(\underline{x}|\delta_j^t) = -q_j + \sum_{i=1}^{N} p_{ij}^{(t)}$$

P358. **B.4**'s subscripts are not formatted properly. It should appear as:

$$\sigma_e(\hat{\delta}) = \frac{1}{\sqrt{\sum_{X=1}^{L-1} n_X p_{Xj} * (1 - p_{Xj})}}$$

P372. The last equation should be labeled C.34. The paragraph should read:

If we take our total sample of individuals and divide it into subgroups and we redefine the standard deviation in Equation C.33 to be the standard deviation of a subgroup, σ_i, with mean μ_i, then its substitution into Equation C.2 gives Thurstone's mental age model; we're assuming that each subgroup is normally distributed. That is, Thurstone (1925; e.g., see p. 441) developed a

model based on the cumulative normal distribution to determine the proportion of individuals of a specified age group correctly responding to an item.

P405. Equation E.24. $\chi^2_{SC} \rightarrow \chi^2_{SC} =$

P406. $\kappa = \bar{\delta}* - \zeta(\bar{\delta}) = 51.3 - 1.80(10.7) = 32$

P407. $\kappa = \bar{\delta}* - \zeta(\bar{\delta}) = 81.5 - 1.80(27.5) = 32$