

Errata for *Statistical Design* (First Printing)

Last Update: August 31, 2009

These errata were compiled for the first printing.

- page 13) Third table: “Poor vs. Others ” should be “Exc. vs. Others”
- page 14) Second display: “ 0 1 – 4/11 – 7/11” should be “0 1 – 7/11 – 4/11 ”
- page 28) Exercise 1.5(a): “Exercise” should be “Example”
- page 37) First Display: “ $y_{ij} - (\mu - \tau_i)$ ” should be “ $y_{ij} - (\mu + \tau_i)$ ”
- page 49) Table 2.5 “41.25” should be: “1.25”
- page 51) line 4 ↑: Remove “ $(\bar{\tau}\gamma)_i$.”
- page) Table 2.6: “ γ_i^2 ” should be “ γ_j^2 ”
- page 54) In the three displays containing “ $\sum_i a_i Y_{i..}$.”, should be “ $\sum_i a_i \bar{Y}_{i..}$.”
- page 65) line 1: “to by covariate ” should be “by the covariate”
- page 70) Exercise 2.1(e): should be “ Calculate the t -statistic for testing $H_0: -3\tau_1 - \tau_2 + \tau_3 + 3\tau_4 = 0$, and find the proportion of variation in Temperature that is *not* explained by the contrast $(-3, -1, 1, 3)$. Data are in dataset IVD.”
- page) Exercise 2.6(b): “ $\bar{Y}_{i..}$ ” should be “ \bar{Y}_i .”
- page 71) Exercise 2.7(a) should be: “Verify the derivation of the least squares estimators and their variances. (*Hint*: First add $\pm y_{ij}$. and show that the estimates will only depend on $y_{ij..}$. Then write $\mu + \tau_i + \gamma_j + (\tau\gamma)_{ij} = \gamma_{ij}$ and show that the least squares estimate of γ_{ij} is $\bar{y}_{ij..}$.) ”
- page 72) Exercise 2.8(b) The display should be

$$\text{Var} \left[\sum_i a_i (\bar{Y}_{i..} - \bar{Y}) \right] = \text{Var} \left[\sum_i a_i (\varepsilon_{i..} - \bar{\varepsilon}) \right] = \text{Var} \left(\sum_i a_i \varepsilon_{i..} \right)$$

- page 74) Exercise 2.11(b): “ $r(t - 1)$ ” should be “ $t(r - 1)$ ”
- page 75) Exercise 2.15(d) should be: “Suppose that a third factor C , with three levels, was crossed with A and B . Obtain the coefficients of the $A \times B \times C$ interaction contrast that compares the first level of B with the average of the other two, the first level of A with the average of the other three, and a linear trend in C . Attempt to interpret the contrast in words. ”
- page 77) Exercise 2.23(a) should be: “ Verify that the EMS for factor A is given by

$$E(\text{MS}(A)) = \sigma^2 + \frac{bcr}{t-1} \sum_{i=1}^t \alpha_i^2.$$

”

page 77) Exercise 2.23(b) should be: “Verify that the EMS for the $A \times B$ interaction is given by

$$E(\text{MS}(A \times B)) = \sigma^2 + \frac{cr}{(t-1)(b-1)} \sum_{i=1}^t \sum_{j=1}^b (\overline{\alpha\delta})_{ij}^2.$$

page 99) First display: “SS(Treatments)) ” should be “ SS(Treatments)”

page 106) First display should be

$$\text{ESS}(\text{Res}) = (b-1)(t-1)\sigma_\varepsilon^2.$$

page 110) line 5 ↑: “Now we take the expected values of the effects in (3.24) under these assumptions, using some of the details given in Exercise 3.30. As an illustration, consider ” should be “Now we take the expected values of the effects in (3.24) under these assumptions. Leaving most of the calculations to Exercise 3.30, as an illustration, consider”

page 112) line 5 ↓: “ $\sigma_\varepsilon^2 + r\sigma_{\tau\beta}^2 + \frac{rt}{t-1} \sum_i (\tau_i - \bar{\tau})^2$ ” should be “ $\sigma_\varepsilon^2 + r\sigma_{\tau\beta}^2 + \frac{rb}{t-1} \sum_i (\tau_i - \bar{\tau})^2$ ”

page 115) First line of text: “evident ” should be “evidence”

page 125) line 13 ↑: “with $1, \dots, t, j = 1, \dots, b.$ ” should be “with $1, \dots, t, t = \#$ judges, and $j = 1, \dots, b.$ ”

page 126) line 14 ↑: “reef that and important ” should be “reef that are important”

page 132) Exercise 3.25(a) should be: “ Show that under (3.5), $\mathbf{Y} = \{Y_{ij}\}$ has a block diagonal covariance matrix with $t \times t$ blocks $\sigma_\varepsilon^2 I + \sigma_\beta^2 J.$ ”

page 132) Exercise 3.25(b): “If we order the vector Y ” should be “If we order the vector \mathbf{Y} ”

page 133) Exercise 3.27(a) should be: “For each $l, m, T_{lm} \sim N(0, \sigma^2).$ ”

page 133) Exercise 3.29(a): The first display should be: “

$$A_1 = B_4'(I - B_1 - B_2 + B_3)B_4 \text{ and } A_2 = I - \frac{1}{r}B_4'B_4,$$

”

page 133) last line: “propertied ” should be ‘properties’”

page 135) first line: “For the Scheffémodel ” should be “For the Scheffé model”

Note: This is a recurring problem throughout the text, and is caused by the definition of Scheffé, which is

`\newcommand{\Sch}{Scheff\acute{\rm e}}`

This can be fixed by adding a hard space

`\newcommand{\Sch}{Scheff$\acute{e}{\rm e}}\;$}`

So I am not going to point out all of the other occurrences of this.

- page 144) First Display should be: “ $\hat{\sigma}_\varepsilon^2 = 1.345$ and $\hat{\sigma}_\beta^2 = 0.00027^2$,”
- page 147) line 4 ↓: “CORRELATION” should be ‘Correlation’
- page 148) Last Display should be: “ $\sigma_\varepsilon^2 = \left(\frac{\sigma_\varepsilon^2}{\sigma^2 + \sigma_\beta^2}\right) (\sigma^2 + \sigma_\beta^2) = (1 - \rho)(\sigma^2 + \sigma_\beta^2)$,”
- page 149) Table 4.2: “ $-1 \leq \rho \leq 1$ ” should be “ $-\frac{1}{t-1} \leq \rho \leq 1$ ”
- page 151) line 5 ↓: “we can write $\sigma_\varepsilon^2 = (1 - \rho)(\sigma_\beta^2 + \sigma_\varepsilon^2) = (1 - \rho)\text{Var}(Y)$ ” should be “we can write $\sigma_\varepsilon^2 = (1 - \rho)(\sigma_\beta^2 + \sigma^2) = (1 - \rho)\text{Var}(Y)$ ”
- page 159) line 6 ↓: “inequality” should be “equality”
- page 160) First two lines:
- (f) Compute the variance for a difference in treatment means.
 - (g) The researcher wants to be able to detect a difference in means as small as $\delta = 1.5\text{cm}$ at $\alpha = .05$. What power does she have to do this? should be
 - (f) The researcher wants to be able to detect a difference in means as small as $\delta = 1.5\text{cm}$ at $\alpha = .05$. What power does she have to do this?
- page 164) Exercise 4.17(d): “ V and V^* under” should be “ V and V^* (Section 3.8.4) under”
- page 173) line 17 ↓: Add

$\gamma_k =$ the effect of time j ,

after

$\tau_i =$ the effect of diet i ,

and before

$S_{ij} =$ the effect of subject j in diet, i (whole plot error),

- page 177) Next to last display: “ $-\bar{\varepsilon}\bar{\delta}$ ” should be “ $-\bar{\varepsilon} - \bar{\delta}$ ”
- page 194) Last sentence before Section 5.4. Replace the sentence: “The first contrast, on the main effect, put us in Case (4), while the second contrast, dealing with the interaction, is Case (3).” with “The first contrast, on the main effect, puts us in Case (4). The second contrast, for the interaction, is also Case (4), but with a smaller variance.”
- page 199) Table 5.8: Caption is “Anova for split plot design with RCB on whole plot treatments. T=Whole Plot Treatment, G = Split Plot Treatment, R=Replication.” but should be “Anova for split split plot design with

CRD on whole plot treatments. T=Whole Plot Treatment, G = Split Plot Treatment, R=Replication.”

page 211) First line of Section 5.6.2: “RCB, Strip plot ” should be “RCB, Split plot”

page 225) Exercise 5.19(d) “effects?” should be: “effects. ”

page 226) Exercise 5.21(b): “SS(Squares)” should be “SS(Subjects in Squares)”

page 228) Exercise 5.25, second paragraph: “A typical design to address these questions for compounds A and B would be a 3 period crossover with the arms A, B, and A + B may or may not all be of interest.” should be “A typical design to address these questions for compounds A and B would be a 3 period crossover with the arms A, B, and A + B, and not all may be of interest.”

page 229) Exercise 5.27(c) “ group of subjects” should be “groups of subjects”

page 234) line 4 ↓: “Referring to the strip plot design of Section 5.6.1, show that” should be

“**5.42** Referring to the strip plot design of Section 5.6.1, show that”

page 253) Display (6.8): “ $\sqrt{\frac{k}{\lambda t}}MS(T \times B)$ ” should be “ $\sqrt{\frac{k}{\lambda t}}MS(T \times B) \sum_i a_i^2$ ”

page 247) line 3 ↑: “above, in 7 ” should be “above, or in 7”

page 253) line ↓: Replace

$$\text{Var} \left(\sum_{i=1}^t a_i \hat{\tau}_i \right) = \sum_{i=1}^t a_i^2 \text{Var}(\hat{\tau}_i) + 2 \sum_{i>i'} \text{Cov}(\hat{\tau}_i, \hat{\tau}_{i'}),$$

with

$$\text{Var} \left(\sum_{i=1}^t a_i \hat{\tau}_i \right) = \sum_{i=1}^t a_i^2 \text{Var}(\hat{\tau}_i) + 2 \sum_{i>i'} a_i a_{i'} \text{Cov}(\hat{\tau}_i, \hat{\tau}_{i'}),$$

page 257) line 8 ↑: “ We have repeatedly used the fact that $2x_i = 0$ ” should be “ We have repeatedly used the fact that $2x_i = 0$ ”

page 259) Last Display: “ $(cp - p) - (p - (1))$, ” should be “ $(cp - p) - (c - (1))$, ”

page 261) Last Display:

$$(1), bc, bd, cd, abe, ace, ade, abcde.$$

should be

$$(1), bc, bd, cd, ad, ac, ab, abcd.$$

page 280) Exercise 6.21(e) “Show that if we append a fourth row with treatments D C B A then we would have a BIBD. Give the parameters of the BIBD. ” should be “Show that if we append a fourth row with treatments D C B A then we would have a Latin square. ”

page 269) Last Display: Replace

$$(.1) \quad \text{Reference Design : } \text{Var}(\hat{\tau}_i - \hat{\tau}_{i'}) = 2\sigma_\varepsilon^2 + 2\sigma_\beta^2,$$

$$(.2) \quad \text{Loop Design : } \text{Var}(\hat{\tau}_i - \hat{\tau}_{i'}) = \sigma_\varepsilon^2 + \frac{1}{2}\sigma_\beta^2 \text{ nonumber}$$

with

$$(.3) \quad \text{Reference Design : } \text{Var}(\hat{\tau}_i - \hat{\tau}_{i'}) = 2\sigma_\varepsilon^2 + 2\sigma_\beta^2,$$

$$\text{Loop Design : } \text{Var}(\hat{\tau}_i - \hat{\tau}_{i'}) = \sigma_\varepsilon^2 + \frac{1}{2}\sigma_\beta^2$$

(Note that this is a Latex mistake where did not have the backslash in front of nonumber. This change will renumber the equations but Latex will get that right.)