

Biostatistics, A Bayesian Introduction

Errata for the First Printing

Check the bottom of the copyright page. If it reads 10 9 8 7 6 5 4 3 2 1 your copy is a first printing and you should make the following corrections.

Chapter 1

Page 2, 5th line after Figure 1, change 50,296 to 50,295

Page 3, line 1, change "Youts" to "Youtz"

Page 7, in the reference to D'Agostini (1998), insert a space before "Garching"

Pages 8, in the reference to Steup, change 2002 to 2001

Chapter 2

Page 10, Figure 2.1, the second zero in the top row should be double zero

Page 11, line -10, change 0.215 to 0.2105

Page 12, at the end of line -10, change "The the" to "The"

Page 20, Table 2.3, the probability of S1 should be 0.0263

Page 24, in the reference to Freedman (1997), insert a comma after Freedman, D.

Chapter 3

Page 25, line 2 of Section 3.2, casino probabilities are in Chapter 2, not 3

Page 25, line -12, 2048/4040 equals 0.5069 or 50.69%

Page 27 insert "(extrasensory perception)" after "ESP"

Page 31, line -9, change "AS" to "AH"

Page 32, line -2, change "of the either" to "of either"

Page 34, line 8, change "sells shirts" to "sells"

Page 45, the reference to Savage (1972) should be:

Savage, Leonard, *The Foundations of Statistics*, 2nd ed., New York: Dover Publications, 1972.

Pages 45, delete the entire reference to Steup.

Chapter 4

Page 50, in Figure 4.2, the leaf corresponding to the stem 2 for females should be 985554332200

Page 50, line -10, the value "19 seconds" should be replaced by "0.19 seconds"

Page 50, line -8, the maximum value for females is 0.48 seconds, not 0.84 seconds

Page 56, line -1, the 0.500 should be 0.450 (i.e., $0.225 + 3.0 \times 0.075 = 0.450$)

Chapter 5

Pages 64, line.4 and 66, line.-11, replace "Chamberlain" by "Chamberlin"

Page 64, line 4, in the reference to T.C. Chamberlin the date should be 1897

Page 64, line -16, replace "O'Conner" by "O'Connor."

Page 64, line -13, after "gravity" insert "(O'Connor and Robinson,2003)"

Page 66, the first term in Equation (5.1) is incorrect, the correct equation is,

$$P(M_j|D) = \frac{P(M_j \cap D)}{P(D)} = \frac{P(D|M_j) \cdot P(M_j)}{\sum_{\text{all models}} P(D|M_i) \cdot P(M_i)}$$

Page 67, line -5, $P(D | M_1)$ is the probability of drawing two white marbles from a cup containing four white and one black marbles (not two black marbles); i.e., change "two black" to "one black"

Page 71, line -3, change "Ned's" by "Nate's"

Page 75, line -8 and line -9, change "model M3 is the also" to "model M3 is also"

Page 80, line -1, the posterior probability for model M.001 is 1.31079E-09

Page 85, in the last line of the caption for Figure 5.18, change "0093" to "0.093"

Page 86, Exercise 5.3. the second occurrence of "6.8 billion" should be "5 billion". I.e., the next to the last sentence should be:

"Comment on the prosecutor's apparent choice of 1 in 5 billion as a worst case prior."

Page 87 the year in the second O'Connor and Robertson reference should be 2003 instead, not 2002

Chapter 6

Page 90, 4 lines above Figure 6.2, change "Fig. 6.1" to "Fig. 6.2"

Page 99, in the caption for Figure 6.11, the value for σ should be 0.0686, not 0.0684. In addition, after "using" insert "Equation (6.7)"

Page 100, last line, change " $\text{beta}(1.5,1.5)$ " to " $\text{beta}(1.5,5)$ "

Page 105, line 12 change " $\text{beta}(4.8,5)$ " to " $\text{beta}(3.4,4.6)$ "

Page 108, the reference to Berry and Stangl should be,

Stangl, D.K., and Berry, D. (1998), "Eliciting Prior Distributions," in *Bayesian Statistics in Medicine: Where are We and Where Should We be Going?*, *Sankhya*, Series B, 60 (1998), pp. 176-195.

Chapter 7

Page 109, in the footnote to Figure 7.1, change "Vol 374, pp7" to "Vol. 348, pp, 7"

Page 112, line -16, change "{T.37, C.27}" to "{T.39, C.19}"

Page 113, Table 7.2 change "Not shown: 18" to "Not shown: 16"
and change "Not shown: 56" to "Not shown: 54"

Page 115 and 117, equations (7.4), (7.5), and (7.7) change "0.3112" to "0.3113"

Page 122, line 1, change "Michaud's" to "Michaud et al.'s"

Page 123, line 20, change " $196/186 = 1.054$ " to " $196/189 = 1.037$ ", and change "5%" to "4%"

Page 125, line 1, the lower endpoint of the CI for the RR should be 0.67, not 0.68

Page 125, line 3, change 32% to 33%

Page 125, line 13 and line 14, change 0.4359 to 0.4364 and change 0.5641 to 0.5636

Page 126, line 16, change 1.43 to 1.42

Page 131, Figure 7.5,

in the first block, change " $x_B = 73$ " to " $x_B = 35$ " and change " $x_C = 78$ " to " $x_C = 37$ "
in the third block, under the second square root sign, change 1297 to 2397

Page 132, line -7, the expression for σ should be,

$$\sigma = \frac{\ln(\text{UCL}/\text{LCL})}{2 \cdot 1.96} = \frac{\ln(7.7/1.0)}{3.92} = 0.52$$

Page 138, line -7, replace "Jonsson" by "Jonsson"

Page 138, line 2, replace "Zheng's" by "Zheng et al.'s"

Page 138: in Exercises 7.10 and 7.11, change "Analyze the data in Exercise 7.7" to "Analyze the data in Exercise 7.9"

Chapter 8

Page 142, lines 10-11, change "34 chips" to "31 chips"

Page 146, 2 lines below after equation (8.3), insert a period after ν .

Page 146, 4 lines below equation (8.3), change "TTailArea.xls" to "tTailArea.xls"

Page 149, equation (8.5), change "6.40" to "6.50" in the third denominator

Page 149, 4 lines below equation (8.5), change "*significangly significant*" to "*statistically significant*"

Page 149, line -13, row 38 of Table A.2 is on page 303, not 30.

Page 150, line 9, insert a space between $|\hat{\Delta}|$ and the word "and"

Page 150, line -8, change "Equation (7.11)" to "Equation (7.10)"

Page 150, line -4, change "Fig. 8.5" to "Fig. 8.6"

Page 151, line -11, change "between 0.01 and 0.00" to "between 0.005 and 0.000"

Page 154, line 6, near the end of the line, change "OR" to "QR."

Page 154, 4 lines above Table 8.2, the median is actually -1.17 and not -1.18

Page 154, 4 lines above Table 8.2, $\ln(0.03) = 3:51$, not 3.58

Page 156, 2 lines below equation (8.16), change the subscript "BOX" to "box"

Page 158, line 6, change -2 to -0.5

Page 159, line -5, the year of the Box and Cox reference should be 1964

Page 159: The second line of equation (8.18) should be, $y = \ln(x+c)$

Page 167, lower block of Table 8.7 and on page 168, line 2, the lower endpoint of the 95% CI should be -0.0004 and not -0.0044

Page 167, line -2, the actual value for $\mu = \bar{d}$ is 0.0310 and not 0.310

Page 168, line 2, change 0.310 to 0.0310 and 0.139 to 0.0139

Page 168, in Table 8.8, panel B,
 \bar{x}_p should be 20.13, not 19.21

\bar{x}_D should be 11.31, not 11.19

Page 178, in Table 8.8, panel C, change 8.020 to 8.82

Page 169, line 13, the 97.5th percentile of the $t(18)$ distribution is 2.10, not 2.12

Page 169, line 14, the 95% confidence interval should be
 $8.82 \pm 2.10 \times 0.559$ or 7.65 to 9.99

Page 172, lines 8 and 9, change "Type" to "DevType" in both lines.

Page 174, in Figure 8.14, the number of lines not shown should be 35, not 34

Page 174: in the SAS program in Figure 8.14
a space is required between "INPUT" and "semester" in this line:

```
INPUT semester $ initials $ gender $ age distance time;
```

In addition, each of the data lines requires a space between the semester code and the student's initials:

--- etc ---

Page 178, the reference to Box and Cox should be,

Box, G. E. P. and Cox, D. R., "An Analysis of Transformations," *Journal of the Royal Statistical Society, Series B*, Vol. 26 (1964), pp. 211–252.

Chapter 9

Page 179, line -10, add a period at the end of the sentence; i.e., right after "agents"

Page 181, first line below Figure 9.1, change “ages 2–3” to “ages 2–3.11”

Page 182, in the legend to Figure 9.2, insert a space between “years” and “(7)” and insert “(8)” at the end of the legend for 5 to 7.11 years.

Page 183, in the 2nd line below Figure 9.3,

change “ $\hat{y}_x = 68.31 - 0.97 \cdot x$ ” to “ $\hat{y}_x = 57.8 - 8.03 \cdot x$ ”

Page 183, in the 4th line below Figure 9.3,

change “ $68.31 - 0.97 \times 20 = 48.9$ ” to “ $57.8 - 8.03 \times 3.00 = 33.7$, because $x = \ln(20) = 3.00$ ”

Page 186, line 9, change e to \hat{e}

Page 186, line -1, change “ $s_y = 17.71$ ” to “ $s_y = 19.77$ ”

Page 187, 1st line after equation (9.13), change “ $r = 0.463$ ” to “ $r = -0.463$ ”

Page 187, line -10, change 0.19 to 0.21 and 19% to 21%

Page 187, line -7, change 19% to 21%

Page 188, at the end of line 9, change 48 to 46

Page 188, second line below equation (9.15),

change "5 years" to "1.5 years"

change " $x_{\text{new}} = 5$ " to " $x_{\text{new}} = \ln(1.5) = 0.41$ "

Page 188, replace Equation (9.6) with,

$$\mu = 57.8 - 8.03 \times 0.41 = 54.5$$

$$\sigma = 17.7 \times \sqrt{1 + \frac{1}{48} + \frac{(0.41 - 2.17)^2}{60.99}} = 18.3$$

Page 188, 4th line below Equation (9.16), change “ $(50 - 63.44)/20.67 = -0.65$ ”

to “ $(50 - 54.5)/18.3 = -0.25$ ”

Page 188, 5th line below Equation (9.16), change 0.74 to 0.60

Page 188, 6th and 7th lines below Equation (9.16), change “three chances in four, or 3 to 1 odds”

to “three chances in five, or 3 to 2 odds”

Page 190, 2nd line below equation (9.17), change “Fig. 9.4 on page 184” to “Fig. 9.5 on page 185”

Page 190, Figure 9.6 should have a legend indicating that black circles represent females and open circles represent males.

Page 191, in Table 9.2 the adjusted mean for males should be \$36,411, not \$36,436

in addition, change the word “nurses” to “employees” in the label for the vertical dotted line.

Page 192, at the end of line 5, the reference should be to Fig. 9.7, not to Fig. 9.2.

Page 193, Table 9.3, the label for Boolean variable “F” should be “Female” and the label for variable “M” should be “Male”

Page 194, in equation (9.24), change “ $(1 - H - B)$ ” to “ $(1 - H - G)$ ”

Page 198, in Table 9.6, the individual in the 8th position has a BS degree, consequently the value for variable x_3 should be 0, not 1

Page 201, line 5, change “SOLUTIONS” TO “SOLUTION”

Page 201, lines 12 and 13 (not counting lines in the table),

change “ $\mu = 47.43$ ” to “ $\mu = 1618.7$ ” and

change “ $\sigma = 32$ ” to “ $\sigma = 47.53$ ”

Page 202, line 20, change “MODEL Sa1 = Gen Yrs / NOINT”,
to “MODEL Sa1 = Gen Yrs*Gen / NOINT”

Page 203, at the end of the line just above the “Solution for Fixed Effects” table, delete “is” and insert “was the source of Equation (9.19).”

Page 204, the SAS output at the bottom of the page is incorrect, in the “Alpha” column change “0.1” to “0.05” (three changes), and in columns “Lower” and “Upper” make these six changes:

change 35382 35786 to 35341 35827
change 36005 36816 to 35923 36898
change -1279.69 -373.49 to -1279.69 -373.49

Page 205, line 6, change “Section 8.6.3” to “Section 8.5.2”

Page 206, at the beginning of line -3, change 0.639 to 0.0639

Page 207, Exercise 9.1, change “FDA” to “NIH”

Page 207, Exercise 9.2, change “data of Exercise 8.6” to “data of Exercise 8.7”

Page 208, remove the reference to Fryauf-Bertschy et al.(1997)

Chapter 10

Page 209, equation (10.2), change “ $\beta_1 \cdot x_1 + \dots + \beta_k \cdot x_k$ ” to “ $\beta_1 \cdot x_1 + \dots + \beta_k \cdot x_k$ ”

Page 211, line 15, change “6.02” to “-6.01”

Page 212: Table 10.2 is missing a column. The correct version is,

Table 10.2 Logits, Odds, and Probabilities via Design Variables

Explanatory Vars			Design Variables				logits, odds, rates, ratios				
Cigs/Day	Sex	Age	X ₁	X ₂	X ₃	X ₄	Logit	Odds	Odds Ratio	Rate P _x	Rel. Risk
0	M	45	1	0	1	45	-9.01	0.000122	}20.1	0.000122	}20.1
20	M	45	1	20	1	45	-6.01	0.002454		0.002448	
20	F	25	1	20	0	25	-6.15	0.002133	}1.1	0.002129	}1.1
20	M	25	1	20	1	25	-6.05	0.002358		0.002352	
$\hat{\beta}$ values:			-9.2	0.15	0.10	0.002					

Page 212, in equation (10.4), change “ $\exp(\beta_2 \cdot \Delta X_2)$ ” to “ $\exp(\hat{\beta}_2 \cdot \Delta X_2)$ ”

Page 213, line 7, change “ $\exp(\beta_3)$ ” to “ $\exp(\hat{\beta}_3)$ ”

Page 214, line -9 and line -10, change “thickness > 3.30 mm” to “thickness > 3.60 mm”

Page 214, line -3, change “ $\exp(\beta_5)$ ” to “ $\exp(\hat{\beta}_5)$ ”

Page 216, line 6, change “Schluchter” go “Schuchter”

Page 216, line 8 the reference should be to equation (7.14) on page 126, not equation (7.15).

Page 216, equation (10.10), change denominator 18.4 to 18.5

Page 217, in Table 10.6, footnote b, change “Equation (10.6)” to “Equation (10.3)”

Page 218, at the end of the “Conclusions” remove the quotation mark

Page 219: The third line of the SAS program in Figure 10.1 is missing a right parenthesis. It should be,
CLASS Def(REF="NB") Vic(REF="NW") / PARAM=REF;

Page 220: The third line from the end of the SAS program in Figure 10.2 is missing the keyword "CLM". The line should be,
SCORE DATA=Request OUT=Predict CLM;

Page 220, line 5, change “Equations (10.5) and (10.6)” to “Equations (10.6) and (10.7)”

Page 220, line 8, change “Fig. 10.3” to “Fig. 10.2”

Chapter 11

Page 225, line 13, change “hosptials” to “hospitals” and “investiagor” to “investigator”

Page 225, Figure 11.1, and page 226, Figure 11.2, change “Wilkins” to “Zierler” and “Zierler” to “Wilkins”

Page 226, Figure 11.2, change the OR for Alvanja from 1.67 to 1.69

Page 227, line 2 of equation 2, change “LCL/UCL” to “UCL/LCL”

Page 227, 7th line after Equation (11.1), change “top panel of Fig. 8.11” to “top panel of Fig. 8.8”

Page 227, line 15, change “pasturized” to “pasteurized”

Page 233, line -16, change “the the” to “the”

Page 233, line -14, change “tail area=0.204” to “tail area=0.0204” and,
in line -13, change “tail area=0.266” to “tail area=0.0266”

Page 234, line 5, change “Table 11.5” to “Table 11.6”

Page 235, just above the caption to Table 11.6 insert at the end of the WinBUGS program:
Initial Values list(tau.lambda=1)

Page 236, Table 11.7, change the entire footnote to,
”Source: Spiegelhalter et al. (2002).”

Page 237, in Figure 11.5, the Data box for Hospital L is incorrect, the correct values are
 $n_{12} = 360$, and $x_{12} = 24$.

Page 238, line -3, after “*Bayes empirical Bayes*” insert, “(Deely and Lindley, 1981)”

Page 239, in lines 12 and 20, change 0.048 to 0.0497

Page 243, line 2, change “Fig. 11.4” to “Fig. 11.6”

Page 244, add this reference,

Deely, J. J. and Lindley, D. V. , "Bayes Empirical Bayes," *Journal of the American Statistical Association*, Vol. 76 (1981), pp. 833-841

Chapter 12

Page 246, in lines 1 and 2 after Table 12.1, in two places change 3401 to 3410

Page 249, at the end of line -16, change “for” to “For”

Page 250, in Table 12.3, the first column of the 8th line should be “11-23”, not “22-23”,
the second column of row “152-157” should be 4, not 3, and
the second column of row “157-229” should be 3, not 2

Page 255, in the 1st line after equation (12.8), change “BetaTailAreaTable.xls” to “BetaTailArea.xls”

Page 255, in line 11 of Section 12.3.3, insert a space between “12.4” and “but”

Page 255, line 14 of Section 12.3.3, change “Equation (7.14) on page 126” to “Equation (7.13) on page 125”

129. On page 256, last line in the bottom panel of Figure 12.4, in the expression for $P(RR > 1)$
change “ $P(Z > -2.31) = 0.989$ ”
to “ $P(Z > -2.07) = 0.981$ ”

Page 259, Figure 12.6, in each data line insert one or more blank spaces between the value for Time and the value for Censored; i.e., change “1280” to “128 0”, “1391” to “139 1”, “2421” to “242 1”, and both instances of “2521” to “252 1”

Page 259, line -1, change “50 months” to “38 months”

Page 261, (12.9) change “ $h_x(t) = h_0(t) \cdot \exp(\beta_1 \cdot x_1 + \beta_1 \cdot x_2)$ ” to “ $h_x(t) = h_0(t) \cdot \exp(\beta_1 \cdot x_1 + \beta_2 \cdot x_2)$ ”

Page 263, line 11, change “Equation (12.2)” to “Equation (12.12)”

Page 264, line 16, change “sum \geq 8” to “sum $<$ 8”

On page 265, line 7, page 267, line 6, and page 267, line 17-18, change “Equation (7.15) on page 128” to “Equation (7.14) on page 126”

Page 265, in the footnote d for Table 12.8, after “baseline category” insert “(all design variables = 0)”

Page 266, in the last line of Table 12.9, the values for the hazard ratios are not correct,
change 13.15 to 13.07 and change 32.50 to 32.46

Page 267, line -7, change “PSR” to “PSA”

Page 269, lines 2 and 3 after Figure 12.8, change “Equation (7.11) on page 122” to “Equation (7.10) on page 120”

Page 269, line -4 (the last data line), change “37 F” to “21 F”

Page 271, line 7, change “Equations (12.8) and (12.17)” to “Equations (12.9) and (12.17)”

Page 271, line -2, change “Table 12.8” to “Fig. 12.8”

Page 273, line 11, change 3.11 to 3.85

Page 274, line 10. replace “US” by “U.S.”

Page 275, in Table 12.12, the age range for the second line in the table should be “1-2” and not “1-1.”

Page 276, Exercise 12.2,
in line 1, change “Table 12.4” to “Table 12.5”, and
in part (a), delete the word “log”

Page 276, Exercise 12.3, in line 3 of part (b), change “[$1 - S_{1-3}(10)$]” to “[$1 - S_0(10)$]”

Page 276, in line 2 of Exercise 12.4, after “survival time” insert “in the 4+ nodes group”

Chapter 13

Page 280, line 8 (counting the section title), change “(10% cure rate), drug B” to “(20% cure rate); the overall cure rate⁸ for this drug is 27%. Drug B”

Page 280, line 8-9 change “(40% cure rate for R, 60% cure rate for F)” to “(40% cure rate for R, 60% cure rate for F, overall cure rate 58%)”

Page 280, bottom, renumber footnote 8 to 9 and insert new footnote 8:

8. $P(\text{Cure}) = P(\text{Cure}|R) \times P(R) + P(\text{Cure}|F) \times P(F) = 0.9 \times 0.1 + 0.2 \times 0.9 = 0.27$

Page 282, in the 1st line after Figure 13.4, change "Nichols" to "Nichol"

Page 286, on the right side of Figure 13.6, change two instances of $c \cdot n$ to $c \times n$

Page 298, in the Knoll and Nichol reference, change the year to 2003

Page 289, line -9, change 0.611 to 0.126

Page 291, in Table 3.3, the second line under "n" on the left, change 102-120 to 103-120.

Page 293, 5th line below equation (13.4), change "n=1323" to "n=1302"

Page 294, Figure 13.11,

in row "n" and in the figure caption, change 1323 to 1302

in row "E(Width)," change 0.735 to 0.740

Page 294, Figure 13.12, row "n"

in the left panel, change 346 to 344

in the right panel, change 276 to 274

Page 294, 4th line after Figure 13.11, change 0.73 to 0.74

Page 295, line 12 (counting the equations),

change "p0" to "p₀"

change "235" to "233"

Page 297, in Exercise 13.8, change "n = 281" to "n = 274"

Appendix B

The WinBUGS screen shots are legible but somewhat fuzzy. There is a hyperlink to a clearer version on the Textbook website.