N. J. Gotelli & A. M. Ellison. 2004. *A Primer of Ecological Statistics*. Sinauer Associates, Sunderland, Massachusetts

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Errata from 3rd and 4th printings (printed January 2007, January 2008)

Chapter 1

1.1 On page 8, legend to Figure 1.1, the number "21" in the fourth line from the bottom of the legend should be "20". (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

Note that this error is also in the 1st and 2nd printings.

1.2 On page 22, 7 lines after Equation 1.6, $P(S)$ should be $P(F)$. The formula for the conditional probability means that $P(F|S) = P(F \text{ and } S) / P(F)$.

Note that this error is also in the 1st and 2nd printings. (*Thanks to Antonio Valdecasas, Museo Nacional Ciencias Naturales, Madrid, Spain*).

1.3 On page 42, third paragraph, first line, "all the" appears twice. One of them could be deleted. (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

Chapter 2

2.1 In Figure 2.4, the text "Subinterval $U = [3,4]$" apperas both above and below the horizontal line. Both are not needed. (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

Chapter 3

3.1 On page 58, in the second equation, $E(X)$ should read $E(Y)$. (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

3.2 On page 61, Figure 3.1. The y -axis should be scaled from 0.0 to 0.5, not 0 to 5. In the inset legend, line 2 (sample mean) the value "2.56" should be "0.256"; and in line 3 (confidence interval) the values "2.43" and "2.69" should be "0.243" and "0.269",

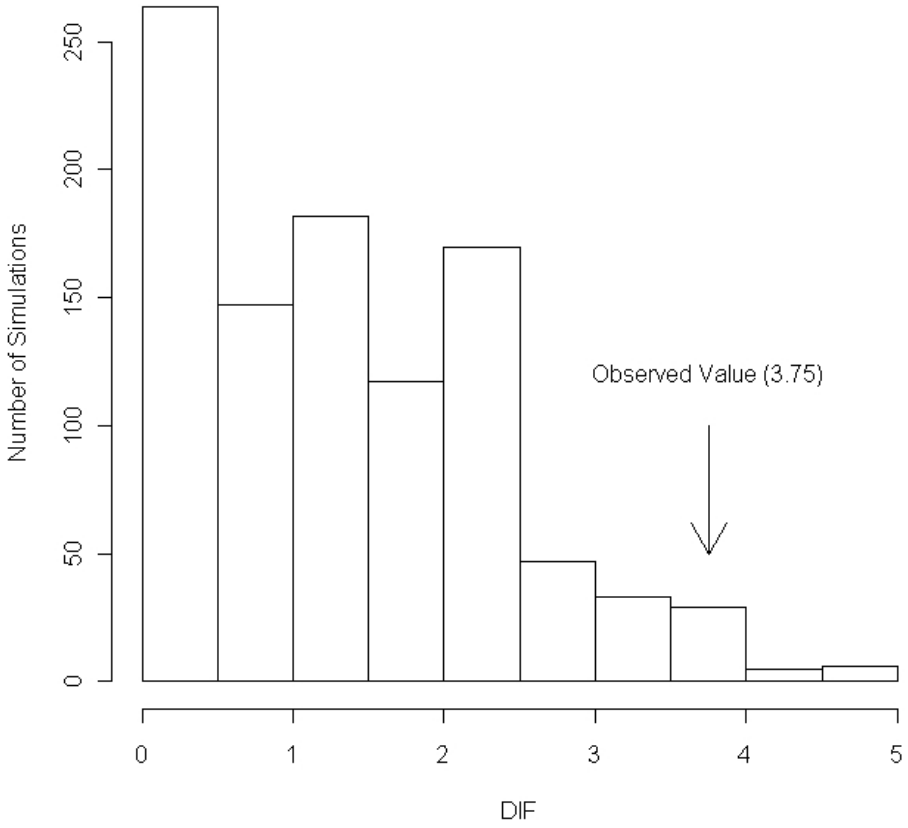
respectively. (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

Note that this error is also in the 1st and 2nd printings.

Chapter 5

5.1 On page 113, Figure 5.3. The figure shows the distribution of F-ratios computed from the data, not the distribution of the DIF itself. The corrected figure is:

Figure 5.3



Code for this analysis has been placed in the datafiles and code section on the previous page (*Thanks to Toshinori Okuyama, National Taiwan University, Taipei, Taiwan*).

5.2 On page 126, line 10 of "Step 4". delete "inverse". The likelihood function of the parameter tau is a gamma random variable. (*Thanks to David Cowley, New Mexico State University / Technical University of Munich).*

Chapter 7

7.1 On page 165, Footnoe 1, delete the word "the" at the end of the first line. (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

7.2 On page 199, Footnote 10, replace both occurrences of "sum of squares" with "mean square" in lines 8. (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

7.3 On page 202, line 2. "three lizard" should read "four lizard". (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

Chapter 8

8.1 On page 217, title to Table 8.1, insert "of" before "*Darlingtonia californica*". (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

8.2 On page 219, legend to Figure 8.2, replace "second" with "fifth" at the end of line 6. (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

8.3 On page 225, Table 8.2. The standard error of the mean of the area of the Galápagos Islands should be 338.8, not 388.8. (*Thanks to Kristine Nemec, Nebraska Cooperative Fish and Wildlife Research Unit, University of Nebraska-Lincoln*).

8.4 On page 235, first paragraph. Since $n = 17$, the appropriate value from the *t*-distribution should have 16, not 17 degrees of freedom. And the quantile should be the 0.025, not the 0.5 quantile. Thus, the value from the *t* distribution is 2.119, not 2.110. So the first paragraph should read:

"...For $n = 17$, the necessary value from the *t* distribution, $t_{0.025[16]} = 2.119$. Thus, the lower bound of the 95% confidence interval (using equation 3.16) = $1.654 - 2.119 \times 0.270 = 1.082$. Simlarly, the upper bound of the 95% confidence interval = $1.654 + 2.119 \times 0.270 = 2.226$. On a logarithmic scale these two values form a symmetrical interval around the mean of 1.654, but when they are back transformed, the interval is no longer symmetrical. The antilog of $1.082 = 10^{1.082} = 12.08$, whereas the antilog of $2.226 = 10^{2.226} = 168.27$, which is not symmetrical around the back-transformed mean of 45.11."

(*Thanks to Kristine Nemec, Nebraska Cooperative Fish and Wildlife Research Unit, University of Nebraska-Lincoln*).

Chapter 9

9.1 On page 242, last paragraph line 3, line 6, and Equation 9.4, d_i^{2n} should read d_i^2(no "*n*") in the superscript. This is a type-setting error introduced in the correction to the 2nd edition. (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

9.2 Footnote 16. The photo caption should read "Sewall", not "Sewell". (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

9.3 Legend to Figure 9.13, line 8. There is an extra zero (0) in the slope parameter on latitude. The equation should read $\log_{10}$(ant species number) = 4.879 - 0.089 × (latitude) - 0.001 × (elevation). (*Thanks to Robert Kellogg, Harvard University*).

Chapter 10

10.1 On page 293, description for Table 10.1, line 15. there should be a "bar" over the Y_i. (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

10.2 On page 293, description for Table 10.1, line 19, there should be no subscript *i* on the grand mean ("bar" over *Y*, not "bar" over Y_i). (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

10.3 On page 300, Table 10.4, the equation for the within-groups (residual) Sum of Squares should have a "bar" over the Y_j.

Note that this error is also in the 2nd printing, and resulted from a mis-setting of the equation following its correction after the first printing (*Thanks to Drew M. Talley, Marine Science & Environmental Studies Department, University of San Diego*).

10.4 On pages 312-313, Table 10.8, the Mean square for Factor *B*(*A*) (plots nested within A) should be $SS_B / a(b-1)$, not $SS_B / (b-1)$. Similarly, the F-ratio for Factor *A* should be $MS_A / MS_{B(A)}$, notMS_A / MS_B.

Note that this error is also in the 1st and 2nd printings. (*Thanks to Toshinori Okuyama, National Taiwan University*)

10.5 On page 318, title for Table 10.9, insert "table" after the first "ANOVA". (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

10.6 Page 331, paragraph 2, interchange 10.3E and 10.3F. (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

10.7 Page 336, four lines from the bottom, and throughout text and index (p. 508). "*implexiforms*" should read "*implexiformis*". (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

10.8 Page 337, caption to Table 10.12. Insert ")" after treatments at the beginning of line 2. (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

Chapter 11

11.1 Page 354, line above Equation 11.4. "j = 1 to n" should read "j = 1 to m". (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

11.2 Page 359, last line of 3rd paragraph should read "the calculation in Footnote 5" (not "Footnote 3"). (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

11.3 Page 372. line 17, and in Literature Cited p. 483. "Fabricus" should read "Fabricius". (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

11.4 Page 377, line 5. change the open parenthesis "(" to a comma ",". (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

Chapter 12

12.1 Page 397, last line of footnote 4. The web address is incorrect. It should be: http://harvardforest.fas.harvard.edu/personnel/web/aellison. (*Thanks to Miriam Plaza Pinto, Universidade Federal do Rio de JAneiro [PPGE-Ecologia], Rio de Janeiro, Brazil*).

12.2 Page 405, footnote 6, line 2. Change "12.5" to "12.6". (*Thanks to Miriam Plaza Pinto, Universidade Federal do Rio de JAneiro [PPGE-Ecologia], Rio de Janeiro, Brazil*).

12.3 Page 410, 3rd line from the bottom. Change "eigenvectors" to "eigenvalues". (*Thanks to Miriam Plaza Pinto, Universidade Federal do Rio de JAneiro [PPGE-Ecologia], Rio de Janeiro, Brazil*).

12.4 Page 422, Figure 12.9 There is no label on the *x*-axis. It should be "Principal coordinate axis 1". (*Thanks to Miriam Plaza Pinto, Universidade Federal do Rio de JAneiro [PPGE-Ecologia], Rio de Janeiro, Brazil*).

12.5 Page 427, line 7. "Sørenson's" should be "Sørensen's". (*Thanks to Miriam Plaza Pinto, Universidade Federal do Rio de JAneiro [PPGE-Ecologia], Rio de Janeiro, Brazil*).

12.6 Page 442, 2nd line from the bottom. "15B" should be "12.15B". (*Thanks to Miriam Plaza Pinto, Universidade Federal do Rio de JAneiro [PPGE-Ecologia], Rio de Janeiro, Brazil*).

Appendix

A.1. Page 449, lines 6-9. Only matrix addition is commutative, subtraction is not. The first two sentences of the paragraph should read:

" Matrix addition is **commutative**, which means that for two matrices **A** and **B** of equal dimension, **A** + **B** = **B** + **A**. Matrix addition is also **associative**: for three matrices **A**, **B**, and **C** of equal dimension, **A** + (**B** + **C**) = (**A** + **B**) + **C**..."

Note that this error is also in the 1st and 2nd printings. (*Thanks to Jon Bakker, University of Washington*).

A.2. Page 453, lines 3, 4, and Equations A.11 and A.12, *Q* should be **Q** (bold roman, not italic). (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

Glossary

G.1. Page 460." **Baye's**" should be "**Bayes'**" in the definition of **Bayes' factor**. (I found this one myself!)

G.2. Page 465. Insert "model" after "statistical" in the definition of **error variation**. (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

G.3. Page 465. The parenthetical formula $(y_{i,k} - y_{j,k})$ in the formula for Euclidean distance should be squared: $(y_{i,k} - y_{j,k})^2$. (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

G.4. Page 469. The chapter reference for "linear regression model" should be [9] not [6]. (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

G.5. Page 475."**column vector**" should read "**row vector**". (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

G.6. Page 478. Reference chapter [12] in the definition of **transpose**. (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

G.7. The following bold-faced text items found in Chapter 12 [12] and the Appendix [A] are not in the glossary. (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

- **associative** - in mathematics, the property that $(a + b) + c = a + (b + c)$. [A]
- **column-orthonormal matrix** - an m x n matrix whose columns have been normalized so that the Euclidean distance of each column = 1. [A]
- **commutative** - in mathematics, the proprety that $a + b = b + a$.[A]
- **decomposition** - in matrix algebra, the re-expression of any m x n matrix **A** as the product of three matrices, $\mathbf{VWU}^T$, where **V** is an m x n matrix of the same dimension as **A**; **U** and **W** are square matrices (dimension n x n); **V** and **U** are column-orthonormal matrices; and **W** is a diagonal matrix with singular values on the diagonal. [A]
- **determinant** - in matrix algebra, the scalar computed as the sum of all possible signed products containing one row element and one column element of a given matrix. [A]
- **dimension** - a 2-dimensional vector specifying the number of rows and number of columns in a matrix. [A]
- **distributive** - in mathematics, the property that $c(a + b) = ca + cb$. [A]
- **identity matrix** - a diagonal matrix in which all the diagonal terms = 1 and all other terms = 0. [A]
- **inverse matrix** - a matrix $\mathbf{A}^{-1}$ such that $\mathbf{AA}^{-1} = \mathbf{I}$, the identity matrix. [A]

- **lower triangular matrix** - a matrix in which all of the elements above the diagonal = 0. [A]
- **orthogonal [2]** - in matrix algebra, two vectors whose product = 0 are called orthogonal. [A]
- **postmultiplication** and **postproduct** - in matrix algebra, the product **BA** of two square matrices **A** and **B**. [A]
- **premultiplication** and **preproduct** - in matrix algebra, the product **AB** of two square matrices**A** and **B**. [A]
- **Principal coordinates analysis** - a generic ordination method that can use any measure of distance. Principal components analysis and Factor analysis (for example) are special cases of Principal coordinates analysis. [12]
- **quadratic form** - a 1 x 1 matrix equal to the product of $\mathbf{x}^T\mathbf{Ax}$, where **x** is a *n* x 1 column vector and **A** is an *n* x *n* matrix. [A]
- **scalar** - a single number, not a matrix. [A]
- **scalar product** - in matrix algebra, the product of a 1 x *n* row vector and a *n* x 1 column vector. [A]
- **singular values** - the values along the diagonal of a square matrix **W** such that an *m* x *n* matrix**A** can be re-expressed as the product $\mathbf{VWU}^T$, where **V** is an *m* x *n* matrix of the same dimension as **A**; **U** and **W** are square matrices (dimension *n* x *n*); and **V** and **U** are column-orthonormal matrices. [A]
- **trace** - the sum of the main diagonal elements of a square matrix. [A]
- **triangular matrix** - a matrix in which all of the elements on one side of the diagonal = 0 [A].
- **upper triangular matrix** - a matrix in which all of the elements below the diagonal = 0. [A]

Index

I.1. Page 500. Change "Galton, Frances" to "Galton, Francis". (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

I.2. Page 507. "Sorenson's" should read "Sørenson's". (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

I.3. Page 507. Delete references to 47n10, 48n11, and 52n13 to Spiders, linyphiid. (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

I.4. Page 508. Change "implexiforms" to "implexiformis". (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

Literature Cited

L.1 Page 482. Change "*Tesserpopra*" to "*Tesseropora*" in the Caffey (1982) reference. (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).

L.2. Page 483. Change "Fabricus" to "Fabricius" in the De'ath and Fabricus (2000) reference. (*Thanks to Victor Landeiro, Instituto Nacional de Pesquisas da Amazonia - INPA - CPEC (Ecologia), Manaus, Brazil*).