

Erratum

The Fundamentals of Modern Statistical Genetics

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The Publisher regrets that the print and online version of the book contain some errors and the corrected texts have been given below.

Chapter 2

Page 26, line 2 from the top. Insert the following sentence after “*crossover event.*”

“The locations along the chromosome where crossovers occur are called chiasmata.”

Line 7 from top, replace “simply randomly” by “simply”

Line 15 from top, insert the word “same” between the words “the” and “paternal”

Page 27, line 4 from bottom, change “ P_0 is the probability of zero crossovers” to “ P_0 is the probability of no chiasma (i.e. crossover)”

Page 28, Line 13 from the top, replace “approaches one” with “approaches zero”.

¹The online version of this title can be found at <http://dx.doi.org/10.1007/978-1-4419-7338-2>

Chapter 3

Page 43, replace Exercise 12 by the following:

“Show that when random mating fails, $Var(X) = 2pq(1 + \rho)$, where ρ is the correlation between maternal and paternal alleles. Hint, write $X = YM + YF$, where YM and YF are dummy variables which are 1 if the maternal or paternal alleles are A , respectively, and zero otherwise.”

Chapter 5

Page 80, replace the text beginning line 7 from the bottom, to the end of the first sentence on page 81 with “Straightforward algebra shows that the allelic correlation, r , can also be expressed as

$$r = \sqrt{p_A p_a} (P(B|A) - P(B|a)) / \sqrt{p_B p_b}.$$

Now using equation (5.1) and simplifying, we have

$$\Delta_B / \sqrt{p_B p_b} = r \Delta_A / \sqrt{p_A p_a}.$$

As we discuss in Box 7.4 in Chapter 7, the power to detect a relationship between the DSL and case-control status depends largely on

$$\gamma_A = n(\Delta_A)^2 / p_A p_a,$$

where n is the number of cases. Likewise the power when testing for association with a marker, power depends on

$$\gamma_B = n(\Delta_B)^2 / p_B p_b.$$

Together these equations imply that

$$\gamma_B = r^2 \gamma_A. \tag{5.2}$$

As a higher gamma means higher power and $r^2 < 1$, one can pay a substantial penalty for testing the marker instead of the disease locus, depending upon the value of r^2 .”

Page 85 replace exercise 6 with

“Show that $D' = 1$ when any cell of the 2×2 table is zero.”

Chapter 6

Page 97 replace exercise 8 by

“Verify that $P(\text{IBD} = 2 \text{ at locus 2} | \text{IBD} = 2 \text{ at locus 1}) = \psi^2$. Verify that $\psi^2 = 1/4$ under H_0 no linkage.”

Chapter 7

Page 101, line 6 from the top replace “Section 6.9” with “Section 7.9”

Page 103, line 8 from the top of subsection 7.2, replace Box 6.1 with Box 7.1

Chapter 8

Page 128

Line 1, put “.” at the end of the equation

Line 17 from top, insert sentence after equation:

“As a result, we have that

$$E(T) = 2r(p_1 - p_2)(c - d).$$

The multiplication factor of r in the bias expression is somewhat arbitrary, and the relevant issue is the expected bias relative to its standard error. Assuming no substructure and using the alleles test variance, the expectation of the variance is $4rp(1 - p)$, where p is the overall allele frequency, and the ratio of bias to its standard error is

$$\sqrt{r}(p_1 - p_2)(c - d) / \sqrt{p(1 - p)}.$$

Thus the expected bias relative to its expected standard error grows with the sample size r , the difference in allele frequencies in the two strata, and the imbalance in cases and controls in the strata.

Page 134

Inside Box 8.2, third bullet from the top should be

- $Z = (z_{ij})$

Bullet 4th from the top should be

- Step 1: Compute the $N \times N$ Variance-Covariance matrix for the probands as $C = Z^T Z / (M - 1)$.

Page 136

Line 1 in the Exercises section, add the sentence “Problems 1 and 2 of this section use the following information.”

Line 10 of the Exercises section, change data entry for #GM-(#IDDM) in strata 4 to be 97 (instead of 7).

Lines 12-13 from top of Exercises section and after end of table, change existing sentence to read “The counts in this table are crude totals taken from the Knowler paper, ignoring age. The percentages in Table 3.2 are age-adjusted, so that the corresponding percentages calculated from the table above will not match those given in Table 3.2.”

Lines 15-17 from top of Exercises section (problem 1) replace Exercise 1 with “1. Using the data in the table above, compute the bias in the alleles test statistic, using formula (8.1). When $r \neq s$, it is easier to just define $T = (\bar{X}_{\text{cases}} - \bar{X}_{\text{controls}})$, omitting r , and compare $E(T)$ with $\sqrt{\text{var}(T)}$. In this case equation (8.1) holds for $E(T)$, but $\text{var}(T) = 2p(1 - p)(r + s)/rs$. Comment on the magnitude of the bias relative to the standard error.”