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Morphometrics with R

– Errata –

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In the following sections, you will find a list of errata of the book. If you find other typos or mistakes, let me know and I will fix them.

2. Acquiring and Manipulating Morphometric Data

p.62: There is a “{” before the second line of code and one must coerce M and N in the function, not directly in the declaration of arguments

```
2“ {M<-as.matrix(M);N<-as.matrix(N);sN<-eigen(var(N))$vectors”
```

3. Traditional Statistics for Morphometrics

p.70: Useful Functions table, change the definitions of `var` and `sd`
`var` computes the sample variance and covariance
`sd` computes the sample standard deviation.

p.73: Formula for the standard error estimate of the mean should be

$$se_M = \frac{\sigma}{\sqrt{n-1}},$$

p.74: Line 8 should be

“Indeed, $\chi^2 = (n-1)s^2/\sigma^2$ follows a χ^2 distribution with $n-1$ degrees”

p.78: First line of code block, replace “`musdom1<-`” by “`musdom<-`”

p.80: Third code block, first line should be

```
“FSIDE<-musaov[[1]][2,3]/musaov[[1]][3,3]”
```

p.83: End of the page, add

“The sample covariance is obtained in premultiplying the covariance by $(n)/(n-1)$.”

p.87: General linear test, replace the formula and following lines by

$$F = \frac{RSS_r - RSS_f}{p_f - p_r} / \frac{RSS_f}{n - p_f},$$

where RSS_f and RSS_r respectively correspond to the residual sum of squares of the full and reduced models, n to the number of observations, and p_f and p_r to the number of parameters of the full and reduced models. This value follows an F -distribution with $p_f - p_r, n - p_f$ degrees of freedom.

p.89: Code block, line 8, replace “`pred.p`” by “`pred.int`”.

p.90: Second code block, line 5 should be

```
“else {prob[i]<-0.05+((msize[i]-5)/5)*0.90}”
```

p.92: Code block, add “)” at the end of the first line.

p.94: Code block, add this line of code between the second and the third lines.
`“data(carniherbi49)”`

p.100: Code block, first line, replace `“geosize[1:24,]”` by `“geosize[1:24]”`.

p.101: Second code block, second line replace `“regmod”` by `“regmod1”`.

p.103: First code block, change the outcome of the command
`“[1] 3.964548924 2.364695987 0.000390131 ”`

p.103: Second code block, change the outcome of the command
`“[1] 7.6945854321 2.4570522718 0.0004060564”`

p.103: Text following the code should be
 “The last singular value is different from zero, and this is also the case for the second model. This is because of the degeneracy of regression.”

p.103-104: Code of the function `coli` should be
 line 8. `“dist[i]<-Angle(X1, X2)”`
 line 14. `“random vectors”, xlab="Z statistic, ylab="# of random”`
 line 15. `“vectors”, sub=paste("Actual z-obs =",round(zobs,5),":”`

p.104: Main text, line 6 should be
 “The two vectors are significantly collinear and we conclude that most shape variation expressed by the measurement is isometric.”

p.110: Line 19 should be
`“isojoli(turtles[2:4,1:24])”`

p.110: Last code block, with recent versions of R, the second line should be
`“proj<-as.matrix(turtles[,2:4])%*%pca[[2]]”`

p.112: Main text, Linear Discriminant Analysis section, line 10 should be
 “the linear discriminant coefficients and are obtained such as”

p.115: Code, line 2 should be
`“>meanproj<-meangroup%*%formlda$scaling”`

p.122: First code block should be preceded by
`“library(cluster)”`

p.126: To obtain figure 3.17 on a single plot add that code line before the code block
`par(mfrow=c(1,3))`

p.129: Main text, line 4 should be
 “*Iris setosa* and *Iris virginica* but...”

4. Modern Morphometrics Based on Configurations of Landmarks

p.156: In the list returned by the `pPsup` function, lines 11 and 12, replace `phi` by `Gam`.

p.165: The code of the function `aligne` is containing an unidentified mistake and is not working all the time. You can change it by this simpler one that is not dependent on other functions:

```

1 aligne<-function(A)
2 {B<-A
3   n<-dim(A)[3]; k<-dim(A)[2]
4   for (i in 1:n)
5     {Ms<-scale(A[, ,i], scale=F)
6       sv<-eigen(var(Ms))
7       M<-Ms%*%sv$vectors
8       B[, ,i]<-M}
9   B}

```

5. Statistical Analysis of Outlines

p.225: Formulae for a^* and for c^* should be
 “with $a^* = a_1 \cos \psi + b_1 \sin \psi$ and $c^* = c_1 \cos \psi + d_1 \sin \psi$; and”

p.225: Remove $\text{mod } \pi$ at the end of the formula for ψ .

p.225: Note that although these formulae are usually found in the literature, they will however not provide a full normalization in all cases. Indeed, two more steps should be added here: one must evaluate whether the phasor rotation is calculated from the semi-minor or the semi-major axis of the ellipse. For this purpose, one must determine which of the axes actually corresponds to the semi-minor and semi-major axis. In addition, the phasor shift is indifferently calculated with one or the other pole of the ellipse (for each harmonic, the reconstructed ellipse is indeed symmetric). This problem can become important, when one wishes comparing several outlines and when one has no idea about a similar outline portion comparable among outlines. This can be checked by calculating the shape distance between the two alternative solutions and a reference, and adding or not π to the phase shift: the smaller shape distance will help selecting among alternatives. In the corrected code I provide here

for the NEF function, I consider that the user selected the starting point on a “homologous” or “similar” half among outlines. This is why the phasor shift is constrained to range between $-\pi/2$ and $\pi/2$. This normalisation works well if a region of the outline can be considered as similar between outlines. In selecting a point in the same region, normalized coefficients can be used for statistical purposes.

p.226: Instead of lines 5 and 6, insert the following code

```
5.1“theta<-(0.5*atan(2*(A1*B1+C1*D1)/”
5.2“      (A1^2+C1^2-B1^2-D1^2))%%pi”
6.1“phaseshift<-matrix(c(cos(theta),sin(theta),”
6.2“      -sin(theta),cos(theta)),2,2)”
6.3“M2<-matrix(c(A1,C1,B1,D1),2,2)*%phaseshift”
6.4“v<-apply(M2^2,2,sum)”
6.5“if (v[1]<v[2]){theta<-theta+pi/2}”
6.6“theta<-(theta+pi/2)%pi-pi/2”
```

p.226: And instead of lines 10, insert the following code

```
10.1“ psi<-atan(Cc/Aa)”
10.1“if (Aa<0){psi<-psi+pi}”
```

6. Statistical Analysis of Shape using Modern Morphometrics

p.246: code at the end of the page: one zero must be shifted from the end to the other for the vector delimited by c, the reconstructed outlines at the right side of figure 6.6 will change accordingly.

```
>Mx1<-mshcoef+max(pc$score[,1])*c(0,ev[1:7,1],
+ 0,ev[8:14,1],0,ev[15:21,1],0,ev[22:28,1])
>mx1<-mshcoef+min(pc$score[,1])*c(0,ev[1:7,1],
+ 0,ev[8:14,1],0,ev[15:21,1],0,ev[22:28,1])
>Mx2<-mshcoef+max(pc$score[,2])*c(0,ev[1:7,2],
+ 0,ev[8:14,2],0,ev[15:21,2],0,ev[22:28,2])
>mx2<-mshcoef+min(pc$score[,2])*c(0,ev[1:7,2],
+ 0,ev[8:14,2],0,ev[15:21,2],0,ev[22:28,2])
```

p.249: For the code corresponding to step 5, same problem and same solution with above. The reconstructed outlines at the right side of figure 6.7 will change accordingly.

```
>Mx1<-mshcoef+ ampl * max(ldascore[,1])*c(0,LDs[1:7,1],
+ 0,LDs[8:14,1],0,LDs[15:21,1],0,LDs[22:28,1])
>mx1<-mshcoef+ ampl * min(0,ldascore[,1])*c(LDs[1:7,1],
+ 0,LDs[8:14,1],0,LDs[15:21,1],0,LDs[22:28,1])
```

p.265: Fifth line of code for mantel.t2 should be

```
“permrowscols(m2,n,coord))”
```

7. Going Further with R

p.284: `mstat` works with `lowertriang` and not `lower.triang`. The fifth line of code must be modified in agreement. In addition there is no “+” before `mstat`.

```
“mstat <- function (m1, m2)”
“+      {cor(lowertriang(m1), lowertriang(m2))}”
```

p.286: The required function for `mantel.t3` are `permrowscols` and `mstat`, not `perm.rowscols` and `mantrstat`. The third to fifth lines of code must be modified in agreement.

```
3“realz <- mstat(m1, m2)”
4“nullstats<-replicate(nperm,mstat(m1,”
5“      permrowscols(m2,n,coord))”
```