ERRATUM (FOR THE THIRD PRINTING OF "BAYESIAN MODELING USING WINBUGS")

The following corrections were spotted in the first, second and third printings of the book and corrections will be available via the book's website.

Acknoledgements

I would like to thank

- Olalekan Uthman (University of Birmingham) for his corrections on example 9.4.
- Magdalini Daskalopoulou (Athens University of Economics and Business) for her corrections in Chapters 1 and 3.
- Efstratia Charitidou and Dimitris Fouskakis (National Technical University of Athens) for their corrections in Chapter 11.
- Philip Turk his corrections and comments in Chapters 2, 3, 8, 11 and in the Appendix.
- Dinos Perakis for his corrections in Chapters 8 and 9.
- Gudbjort Gylfadottir for his correction in Chapters 1.
- Efstratia Charitidou for her in Chapters 1, 2 and 11.
- Gheorghe Doros for his corrections in Chapters 8 and 9 (especially for correcting the variance of the zero inflated models in page 288).

– Vladimir Britikov (correction of gamma coefficient in page 9); David Evans (summation in eq. 8.6); Quan Li (clarification in page 17)

Corrections

Chapter 1

1. **Page 3, lines 7–8 of Section 1.3**: This equation is also called *Bayes' rule*, ~~although~~ and it was ~~originally~~ also found independently by Piere-Simon de Laplace in 1774 ...

2. **Page 4, paragraph above Section 1.4**: Using similar arguments we can calculate the probability of a nonsmoker to develop the disease, which is equal to ~~0.0099~~ 0.00577 and the relative risk (RR) is equal to

$$RR = \frac{P(\text{case}|\text{smoker})}{P(\text{case}|\text{nonsmoker})} = \frac{0.0185}{\text{~~0.0099~~ } 0.00577} = \text{~~1.87~~ } 3.2 \ .$$

   Therefore, the probability for a smoker to develop lung cancer is ~~87% higher than~~ 3.2 times the corresponding probability for nonsmokers.

3. **Page 7, 2nd line from the bottom**:

$$f(\lambda) = \frac{b^a}{\Gamma(a)} \text{~~}\lambda^{a-1}\text{~~} \lambda^{a-1} e^{-b\lambda}.$$

4. **Page 9, lines 4 and 7**: $\frac{\Gamma(a)\Gamma(b)}{\Gamma(a+b)} \rightarrow \frac{\Gamma(a+b)}{\Gamma(a)\Gamma(b)}$

5. **Page 10, 6th line of the 2nd block of equations**:

$$\propto \quad \exp\left(-\frac{1}{2}\left\{\left[\frac{n}{\sigma^2} + \frac{1}{\sigma_0^2}\right]\mu^2 - 2\mu\left[\frac{n\overline{y}}{\sigma^2} + \frac{\mu_0 \text{~~+~~}}{\sigma_0^2}\right]\right\}\right)$$

6. **Page 11, 1st line after 2nd equation**: In NIG$(\widetilde{\mu}, \widetilde{c}, \widetilde{a}, b)$ and NG$(\widetilde{\mu}, \widetilde{c}, \widetilde{a}, b)$, b must be replaced by $\widetilde{b}$.

7. **Page 12, 2 lines above Section 1.5.5**: ~~a~~ $n > 2 - 2a$ and ~~a~~ $n > 4 - 2a$.

8. **Page 17, line 6**: The actual posterior distributions are gamma$(8.001, 8.001)$ and gamma$(4.001, 8.001)$ assuming the prior described in the previous sections. Parameters are rounded to the closest integer for simplicity.

Chapter 2

1. **Page 33, equation in the middle of the page**:

$$\text{~~}Y_1\text{~~}Y_0 \sim \text{binomial}(\pi_0, n_0) \text{ and } \text{~~}Y_0\text{~~}Y_1 \sim \text{binomial}(\pi_1, n_1)$$

2. **Page 39, 2nd equation in item 2**: A square root sign is missing from the right part of the equation. The correct expression is the following

$$\widehat{SD}\big(G(\boldsymbol{\theta})|\boldsymbol{y}\big) = \sqrt{\frac{1}{T'-1}\sum_{t=1}^{T'}\Big[G(\boldsymbol{\theta}^{(t)}) - \widehat{E}\big(G(\boldsymbol{\theta})|\boldsymbol{y}\big)\Big]^2} \ .$$

3. **Page 46, 2nd paragraph, 3rd line**: "... convergence of the chain can~~not~~ be accelerated ..."
4. **Page 63, last line of the R code**: `H=T` → `H=H`.
5. **Page 77, after second enumeration**: "Clearly, in ~~2~~ 3 , ..."
6. **Page 79, the title of the computational not**: COMPUTATIONAL NOTE ~~(DIC for mixture models WinBUGS)~~ (Sampling from truncated distributions)

Chapter 3

1. **Page 96, 2nd line from the bottom**: "... and for $x < a, \ldots$" → "... and for $x < -a, \ldots$".
2. **Page 105, 3rd lines of the 3rd block of code**: Must be replaced by

```
2, 14,  5, 17,  8, 20, 11, 23,
```

Chapter 4

1. **Page 126, equation after the 1st code**: Add subscript i in π:

$$\prod_{i=1}^{8} \pi_i^{y_i}(1-\pi)^{N_i-y_i} \rightarrow \prod_{i=1}^{8} \pi_i^{y_i}(1-\pi_i)^{N_i-y_i}$$

Chapter 8

1. **Page 279, 4th line of Section 8.2.1**: The variance is equal to $\text{Var}(Y_i) = \mu_i\tau^{-1}$.
2. **Page 283, 2nd line after the DI expression**: The correct variance expression is $V(Y) = \lambda(\lambda + r)/r$.
3. **Page 283, 8th line from the bottom**: The correct expression is $\text{logit}(\pi) = \log(r) - \eta$ instead of $\text{logit}(\pi) = -r - \eta$.
4. **Page 288, 8th line from the bottom**: The correct expression for the variance is

$$V(Y) = (1-\pi_0)\Big(V(Y_D) + \pi_0\,[E(Y_D)]^2\Big);$$

   i.e. $E(Y_D)$ must be raised in the power of two. The corresponding codes of example 8.3 were corrected and uploaded in the web-page.
5. **Page 288, 7th line from the bottom**: The correct expression for DI is $\text{DI} = V(Y_D)/E(Y_D) + \pi_0 E(Y_D)$.
6. **Page 291, rows 13–16 of Table 8.6**: The results using the correct formula for the variance in page 288 are the following:

Parameter[a]	ZIP		ZINB		ZIGP		Generalized Poisson	
Var(Y_1)	18.62	(16.60, 20.82)	43.89	(33.26, 59.46)	45.01	(33.13, 62.86)	71.47	(43.65, 122.4)
Var(Y_2)	17.27	(15.61, 19.00)	35.48	(26.47, 48.10)	37.50	(27.00, 52.95)	75.44	(40.71, 144.0)
DI_1	3.18	(2.74, 3.67)	7.44	(6.08, 9.27)	7.66	(6.09, 7.54)	12.00	(8.38, 17.52)
DI_2	4.03	(3.61, 4.48)	8.22	(6.77, 10.15)	8.64	(6.91, 8.51)	16.87	(11.07, 26.79)

7. **Page 292, lines 9–10 in the WinBUGS code**: `x3` must be substituted by `z3`. The correct code is the following

```
z1[1] <- y1[i] - z3[i]
z2[1] <- y2[i] - z3[i]
```

8. **Page 293, lines 2 and 6 of Example 8.4**: The actual sample size is 200 and not 100.

9. **Page 297, 5th line from the bottom**: The correct expression for the likelihood of a survival model is given by

$$f(\boldsymbol{y}|\boldsymbol{\xi},\boldsymbol{\theta}) = \prod_{i=1}^{n} f(y_i|\boldsymbol{\theta})^{1-\xi_i} S(y_i|\boldsymbol{\theta})^{\xi_i}$$

10. **Pages 299, eq. 8.6**: The subscript in the summation must be j and not i and should take values from 1 to p; correct expression $\sum_{j=1}^{p}$.

Chapter 9

1. **Pages 310, 3rd line**: $\sigma \boldsymbol{I}_2 \rightarrow \sigma^2 \boldsymbol{I}_K$.

2. **Pages 315, line 2 of the 2nd paragraph**: The DIC value is actually 73.1 and not 67.8 (which is the Dbar).

3. **Pages 319–321, example 9.4**: The data for study 8 and the code of this example was wrong. More specifically

   a. **Page 319, Table 7**: The odds ratio for the 7th study is ~~12.41~~3.41.

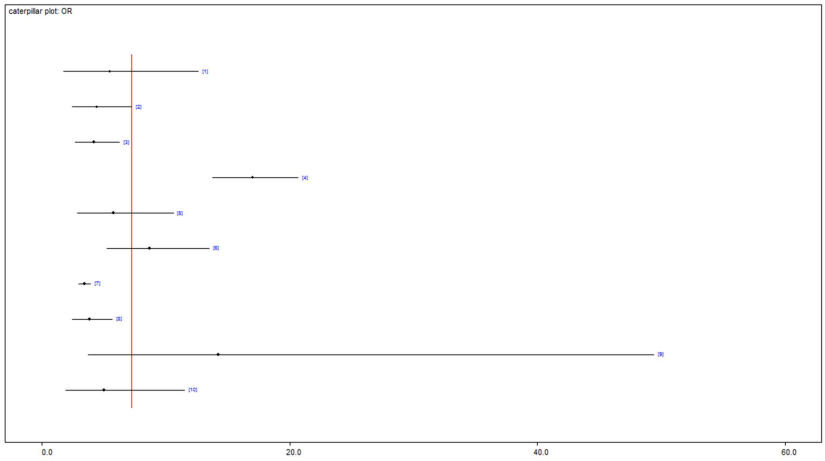
   b. **Page 319, 1st line after the block of equations**: $\widehat{\sigma}_k^2$ must be replaced by $\widehat{\sigma}_k$.

   c. **Page 320, 1st block of code**: The correct code is the following

```
for (k in 1:K1){
      logor[k] <- log(or[k])
      selogor[k] <- log(U[k]/L[k])/(2*1.96)
      precision.logor[k] <- 1/pow(  selogor[k], 2)
      logor[k] ~ dnorm( theta[k],  precision.logor[k] )
      logor[k] ~ dnorm( theta[k],  selogor[k] )
      theta[k]~dnorm( mu.theta, tau.theta )
      OR[k] <- exp(theta[k])
 }
```

d. **Page 320, 2nd paragraph from the end of Section**: The posterior mean of the overall odds ratio is found equal to ~~5.28~~5.92, with 95% of the posterior values ranging from ~~3.33~~3.55 to ~~9.05~~9.44. Error bars of the estimated odds ratios of each study using the hierarchical model presented above are depicted in Figure 9.6.

e. **Page 321, Figure 9.6**: must be replaced by the following figure



The corrected pages of this example will be also available in a pdf file in the book's website.

4. **Pages 328, 3rd line from the bottom**: $n = 60$ is missing. The correct data code is the following

```
list( n=60, F=c(0,7, 9,23,60), Y1=c(0,1,0,1), Y2=c(0,0,1,1) )
```

5. **Pages 330-331**: Items must be denoted with t instead of j; similarly s_j must be replaced by s_t.

Chapter 11

1. **Page 391, lines 3–5 of Section 11.2**: Let us consider the usual normal prior distribution for θ under the ~~null~~ alternative hypothesis centered around the value of the alternative H_0.

2. **Page 396, 6th line from the bottom**:

$$= \widehat{f}(\theta_1^*|\boldsymbol{y},m) \,\cancel{\prod_{j=1}^{d}}\, \prod_{j=2}^{d} \widehat{f}(\theta_j^*|\theta_1^*,\ldots,\theta_{j-1}^*,\boldsymbol{y},m)$$

3. **Page 396, 3rd and 4th line from the bottom**:

$$\widehat{f}(\theta_1^*|\boldsymbol{y},m) = \frac{1}{T}\sum_{t=1}^{T} f(\theta_1^* \,\cancel{(t)}\, |\theta_2^{(t)},\ldots,\theta_d^{(t)},\boldsymbol{y},m)$$

$$\widehat{f}(\theta_j|\theta_1^*,\ldots,\theta_{j-1}^*,\boldsymbol{y},m) = \frac{1}{T}\sum_{t=1}^{T} f(\theta_j^* \,\cancel{(t)}\, |\theta_1^* \,\cancel{(t)}\, ,\ldots,\theta_{j-1}^* \,\cancel{(t)}\, ,\theta_{j+1}^{(t)},\ldots,\theta_d^{(t)},\boldsymbol{y},m).$$

4. **Page 415,** : "... when we use independent priors ~~are used~~ ..."

5. **Page 416, lines 4 and 5**: Must be replaced by

```
mb0 <- prop.mean.beta0
taub0 <- (gamma0/n + (1-gamma0))/pow(prop.sd.beta0, 2)
```

Appendix A

1. **Page 440, line 8 (number 7 in the list)**: Must be deleted since it is stated also in line 4.

2. **Page 440, 2nd line from the bottom (number 3 in the second list)**: "$a \rightarrow \mu_a$" $\rightarrow$ "$\mu_a \rightarrow a$".