CORRECTIONS TO NAIVE DECISION MAKING

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This correction page is based on corrections by John Haigh, Robert MacKay and Nigel White to whom many thanks

Page 4, line -3 Reverse inequality sign.

Page 5, line 2 Reverse inequality sign.

Page 6 In (iii) reverse both inequality signs.

Page 15 Second para of section, reverse inequality sign.

Page 53 Exercise 2.4.13, 5th line delete second 'in'.

Page 58 Exercise 2.4.24 First sentence. 'Players pay the banker 1/40 of a unit to take part in a game of Simplejack. In this game a large pack of cards containing ... '

Page 65 Fifth line of footnote 23 'will be discussed'

Page 67 Example 2.5.16, second displayed inequality should read

$$\Pr\left(\left|\frac{X_1 + X_2 + \cdots + X_n}{n} - 1\right| > \delta\right) \geq 1 - \epsilon.$$

Page 69 Let $X_{jk} = 1$ if A_k chooses the jth grotto.

$$Z = \sum_{k=1}^{n} Y_1 X_{1k} + \sum_{k=1}^{n} Y_2 X_{2k} + \cdots + \sum_{k=1}^{n} Y_m X_{mk}.$$

Page 74 Kelly recommends $t = 1/12$. Same correction line 1 of Exercise 2.6.7.

Page 75 First displayed formula

$$\frac{11}{12} \times \left(\frac{11}{12} + \frac{1}{12}\right) = \frac{726}{720}$$

The figures in the next paragraph could be changed a little but remain of the correct order.

Page 75 Exercise 2.6.7, line 1. 'This part requires'

Page 77 Exercise 2.6.10. I fell asleep at the wheel. Should read

I bet a fixed amount t. Thus my fortune $X_{j+1}(t)$ after the $j+1$th throw is given by

$$X_{j+1}(t) = \begin{cases} X_j(t) + tu & \text{if the } j\text{th throw is heads,} \\ X_j(t) - t & \text{if the } j\text{th throw is tails.} \end{cases}$$

Page 81 Case C should be specified

(iv) In the remaining Case C, when $p_1u_1 > 1$ and

$$\frac{1}{u_1} + \frac{1}{u_2} + \cdots + \frac{1}{u_n} > 1,$$

show that

Page 90 Exercise 3.2.6 (ii). The final term of the sum should be $(m-1)^2x^{m-2}$.

Page 104 First sentence of third line 'Thus g' is increasing.'

Page 110 First line. I have the ranges of summation in a twist. Should be

$$p_i = \sum_{j=1}^{m} \pi_{ij},\ \ q_j = \sum_{i=1}^{n} \pi_{ij}$$

Page 121 Lemma 4.3.4 (iv)'. I was asleep at the wheel. Should read

(iv) If $a \equiv a'$ and $b \equiv b'$ then $a + b \equiv a' + b' \mod n$.

Page 124 Proof of Lemma 4.3.10 (ii), third line should read.

$$y \equiv v_1y_1 + v_2y_2 \equiv v_1 \times 0 + v_2 \times 1 \equiv v_2$$

Page 155 Case (iv)

$$A_1 = \{X_1 < X_2, X_3, X_4, X_5\},$$
$$A_2 = \{X_2 < m\},\ A_3 = \{X_3 < m\},\ A_4 = \{X_4 < m\},\ A_5 = \{X_5 < m\}$$

Page 170 Paragraph after Exercise 5.5.7.

What happens if we try to work out the shortest paths between every pair of towns?

Page 173 Exercise 5.5.18 (i) Replace the meaningless 'length a decreasing cycle' by 'a distance decreasing cycle'.

Page 186 (Thanks to David Pauksztello) 5th line down 'everybody else's preferences $B > C > A$'

Page 192 Replace 'C beats A' by 'A beats C'

Page 200 Third complete paragraph, second line. Replace 'choosing row 1 heads with' by 'choosing row 1 with'

Page 205 Second line of first complete paragraph

We shall say that Rowena adopts strategy $\mathbf{p}$ if she chooses row i with probability p_i and that Calum adopts strategy $\mathbf{q}$ if he chooses column j with probability q_j.

page 254 The first computation in Case (5) is wrong. Paragraph should read

(5) If C misses both, then, by (2), we know that B will fire at A. If B hits A, then the result is a duel between C and B in which C and B

fire alternately and C has first shot. The probability that C will win is then
$$\frac{c}{b+c-bc}.$$
If B misses A, then, by (1), we know that A will fire at B. C now has one shot at A. With probability c, he hits A and wins the match. If he misses A then he must lose. The probability that C wins the match if his first shot goes wide is thus
$$\begin{aligned}\Pr(B \text{ hits } A)&\frac{c}{b+c-bc} + \Pr(B \text{ misses } A)c \\ &= \frac{b}{b+c-bc} + (1-b)c = c\frac{2b+c+b^2c-2bc}{b+c-bc}.\end{aligned}$$
Thus, if $c(2b+c+b^2c-2bc) > c(1-b)$, that is to say $3b+c(1-b)^2 > 1$, C is better off if he misses both A and B. and should therefore make sure to miss. If $3b+c(1-b)^2 < 1$, C should aim for A. If $3b+c(1-b)^2 = 1$, he can do either.

Exercise 9.2.3 (i) Show that, if $b \leq 1/4$, C should always try to hit with his first shot. Show that, if $b \geq 1/3$, C should always shoot wide with his first shot.

*P*age 267 The game **HHH** was invented by Walter Penney (Journal of Recreational Mathematics, October 1969, p. 241) and is referred to as Penney's game. Strong apologies.

*P*age 274 There is an error in the last line which affects the following paragraph

We now observe that
$$\begin{aligned} B(I,N) - B(I,P) &= \frac{2-p}{1-p} - 3 = \frac{2p-1}{1-p}, \\ B(I,N) - B(I,O) &= \frac{2(1+p)-3}{1-p^2} = \frac{2p-1}{1-p^2}, \\ B(I,P) - B(I,O) &= -\frac{3p^2}{1-p^2} + \frac{p}{1-p} = \frac{p(1-2p)}{1-p^2}. \end{aligned}$$
Thus
$$\begin{aligned} &B(I,N) > B(I,P) \text{ for } p > 1/2,\ B(I,P) > B(I,N) \text{ for } 1/2 > p, \\ &B(I,N) > B(I,O) \text{ for } p > 1/2,\ B(I,O) > B(I,N) \text{ for } 1/2 > p, \\ &B(I,O) > B(I,P)) \text{ for } p > 1/2,\ B(I,P) > B(I,O) \text{ for } 1/2 > p. \end{aligned}$$
Looking at these results, we advise Sonia to play the strategy 'never press' (or, what turns out to be exactly the same strategy, 'do the same as Tania') whenever $p \geq 1/2$, to follow the strategy 'do the opposite of

Tania' when $1/2 \geq p \geq 0$. (If $p = 1/2$ there is a free choice between the two recommended strategies.)

*P*age 285 Exercise 10.1.5 (ii)

Can you suggest three distinct strategies which are as good as bold play?

*P*age 285 Exercise 10.1.6 first line

stake of 1 dollar

*P*age 286 Second displayed equation

Show, by induction, or otherwise that

$$p_r(f) = p_r(k2^{-r}) \text{ if } k2^{-r} \leq f < (k+1)2^{-r}$$

for integers k with $0 \leq k \leq 2^r$.

*P*age 290 Exercise 10.2.7 (ii) line 3 delete second 'better' (or, if you prefer, first 'better' but not both).

*P*age 290 Third line of second paragraph after Exercise 10.2.8. replace 'there' by 'their'.

*P*age 290 Expression

$$10\,000 \times \mathbb{E}(\text{expected number of months to bankruptcy}),$$

should be replaced by

$$10\,000 \times \text{expected number of months to bankruptcy},$$

*P*age 308 The statement

In the UK National Lottery 50% of the cost of each ticket is returned to the buyers as prizes.

should be modified by the insertion of the word 'roughly'.

*P*age 318 L. F. Richardson not J. F. Richardson!

*P*age 322 Footnote clarification.

and the elder Bush

*P*age 323 Middle

The probability of throwing ten heads in a row is now $(1/2)^{10}$, so, perhaps, it would be good idea.

*P*age 352 Exercise C5 (ii) line one. Replace doubled 'a' by a singleton.

Bibliography The Martin Gardner book [23] is

The 2nd Scientific American Book of Mathematical Puzzles and Diversions

index Should contain reference to Penney to go with earlier correction.

*P*age 368 ref [41]: J. Maynard Smith. (oops, thanks to Charles Goldie)