Errata
Critical Phenomena in Natural Sciences

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Abstract

This is a list of corrections to the first edition of the book Critical Phenomena in Natural Sciences, Chaos, Fractals, Self-organization and Disorder: Concepts and Tools, 432 pp., 87 figs., 4 tabs (Springer Series in Synergetics) ISBN 3-540-67462-4, Date of publication: Oct 2000

1 Chapter 1

page 6, 16th and 17th lines of section 1.2.3,, change

"global warming is assumed to increase the likelihood of large hurricanes to the value $P(\mathrm{rate} \leq 1 \text{ per century}|H_{\mathrm{e}})$ that we take also equal to 0.5. Thus, $P(\mathrm{rate} > 1 \text{ per century}|H_{\mathrm{e}}) = 0.5$ also"

into

global warming is assumed to increase the likelihood of large hurricanes to the value $P(\mathrm{rate} > 1 \text{ per century}|H_{\mathrm{e}})$ that we take equal to 0.5. Thus, $P(\mathrm{rate} \leq 1 \text{ per century}|H_{\mathrm{e}})$ decreases to 0.5.

2 Chapter 2

1. page 30 starting with one line above equation (2.28), change c into C also in equations (2.28) and (2.29) to avoid confusion with the character c used in equations (2.24) to (2.26).
2. page 35 one line below equation (2.55):

$$\text{...the same the stochastic process...} \rightarrow \text{...the same stochastic process...} \tag{1}$$

3. page 37, equation (2.65) should be replaced by

$$\hat{P}(k) = \exp\{\sum_{n=1}^{\infty} \frac{N c_n}{n!} (ik)^n\}. \tag{2}$$

4. page 41, change equation (2.71) into

$$c_l^{(n+1)} = 2 c_l^{(n)} \ . \tag{3}$$

3 Chapter 3

1. page 56, change first line and equation (3.37) of section 3.3.2 into

   "The probability to observe $f_1, f_2, ..., f_n$ from N realizations is simply

$$P(f_1, f_2, ..., f_n) = \frac{N!}{(N f_1)!(N f_2)!...(N f_n)!} \prod_{l=1}^{n} [P(v_l)]^{N f_l} \ , \tag{4}$$

2. page 77, change equation (3.100) into

$$P(u) = P(r(u))\ 2\pi r\ \frac{dr}{du} \sim \frac{1}{u^3} \ . \tag{5}$$

4 Chapter 4

page 96, 18th line of the section 4.3, change

"It also bad news because there..."

"It is bad news because there..."

5 Chapter 5

Starting from the bottom of page 120 and continuing up to equation (5.11), change to the following text:

"The sum (5.7) can then be rewritten

$$M_q(l) = \sum_{\alpha} J\ p_n^q\ N_\alpha(l) = \sum_{\alpha} J\ l^{\alpha q}\ (L/l)^{f(\alpha)} \ , \tag{6}$$

where J is the Jacobian of the transformation from the box index to its exponent α. The sum over α in the right-hand-side of (5.10) can be estimated by the saddle-node method for small l. The saddle-node value α^* is such that $l^{\alpha q}\ (L/l)^{f(\alpha)}$ is maximum, i.e., α^* is solution of $q = df/d\alpha$. This yields $M_q(l) \sim l^{\alpha^* q - f(\alpha^*)}$. Comparing this expression with the definition (5.8), we find the general relationship between a moment of order q and a singularity strength α, expressed mathematically as a Legendre transformation:

$$f(\alpha) = q\alpha - (q-1) D_q \ . \tag{7}$$

To obtain (7), we have used the fact that the Jacobian J does not exhibit a singular behavior for small l and thus does not contribute to the scaling law. From the Legendre transformation, it is clear that q is the slope of the function $f(\alpha)$. Thus in particular, $\alpha(q=0)$ is the value that makes $f(\alpha)$ maximum and equal to D_0 (equal to the capacity dimension)."

6 Chapter 6

page 153 first line of section 6.8.2, change "Suppose we observe $0 \leq x_1 \leq x_2 \leq .... \leq x_n$."

into

"Suppose we observe $0 < x_1 \leq x_2 \leq .... \leq x_n$."

7 Chapter 10

1. page 216, change equation (10.5) into

$$\langle [A(t)]^2 \rangle = \int_0^t d\tau \int_0^t d\tau' e^{-\delta(t-\tau)} \; e^{-\delta(t-\tau')} \langle f(\tau) f(\tau') \rangle \tag{8}$$

2. page 217, 11th line below equation (10.7), change the three following lines into

   "Using (10.6), we see that these results (10.6) and (10.7) hold for $\mu_c - \mu \geq D^{1/2}/A_s$, i.e. not too close to the bifurcation point, for which the nonlinear correction is negligible. For $\mu_c - \mu < D^{1/2}/A_s$,..."

8 Chapter 11

The abscissa of figure 11.5 should be $|K - K_c|$ instead of $\log |K - K_c|$.

The ordinate of figure 11.5 should be $|f(K - K_c)|$ instead of $\log |f(K - K_c)|$.

9 Chapter 13

page 284, starting with the line ""In the early stage of accelerating friction,..." below equation (13.54), change it and the three following lines into

"Already in the accelerating phase of sliding, $\dot{\delta} \gg D_c/\theta$ and we can neglect the first term $1/\dot{\delta}$ in the right-hand-side of (13.54). This yields

$$\theta = \theta_0 \exp\left(-\delta/D_c\right) \; , \tag{9}$$

which means that θ evolves towards an ever diminishing state."

10 List of References

page 396: reorder the references starting with "Bouchaud..." according to the correct chronology.