Erratum: Entropy production and coarse-graining in Markov processes

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Contents

1. Error in appendix B 2
2. Errors in section 2.4 2
   Acknowledgments 3

1. Error in appendix B

An error has been discovered in appendix B. In particular expression (B.3) is not correct and the error propagates down to (B.6). In particular, equation (B.3) should be:

\[ P_n = P_{n-1} \frac{W_{n-1 \rightarrow n}}{W_{n \rightarrow n-1}} - \frac{J}{W_{n \rightarrow n-1}} = \ldots = P_n \prod_{k=1}^{N} \frac{W_{k-1 \rightarrow k}}{W_{k \rightarrow k-1}} - J \left( \sum_{j=0}^{N-1} \frac{1}{W_{n-j \rightarrow n-j-1}} \prod_{k=1}^{j} \frac{W_{n-j+k-1 \rightarrow n-j+k}}{W_{n-j+k-1 \rightarrow n-j+k-1}} \right), \]  

with the convention that \( \prod_{k=1}^{0} = 1 \).

Consequently, the expression for the current \( J \) becomes:

\[ J = \left( \prod_{k=1}^{N} \frac{W_{k-1 \rightarrow k}}{W_{k \rightarrow k-1}} \right) - 1 \]  

(2)

We remark that the qualitative conclusion of the appendix is unaltered. Indeed, the numerator of expression (2) is unaffected by decimation, while eliminating a fast state reduces the denominator by an amount \( \Delta D \):

\[ \Delta D = D_o - D_d = \sum_{n=1}^{N} \sum_{j=0}^{N-1} 1/W_{n-j \rightarrow n-j-1} \prod_{k=1}^{j} W_{n-j+k-1 \rightarrow n-j+k} \prod_{k=1}^{j} W_{n-j+k-1 \rightarrow n-j+k}. \]  

(3)

Thus, we can still conclude that the current in a single loop always increases after decimation.

2. Errors in section 2.4

Three errors have been discovered in section 2.4, where the kinesin model is discussed:

(1) All occurrences of \( t_{\text{max}} \) should be replaced by \( t \).

(2) Three lines from the end: \( W_{25}/W_{52} = 3 \times 10^3 \) is wrong, it should read \( W_{25}/W_{52} = 1.25 \times 10^6 \).

(3) In figure 8, the \( x \)-scale is wrong, it should be multiplied by a factor 10; this error is a consequence of a wrong time-normalization (integrated entropy production has been divided by a time length ten times larger than its correct value).
As is clear from the above description, the three errors have no consequences on any part of the discussion.

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