

Correction

Correction: Wolpert, D.H. The Free Energy Requirements of Biological Organisms; Implications for Evolution. *Entropy* 2016, 18, 138

David H. Wolpert ^{1,2,3}

¹ Santa Fe Institute, 1399 Hyde Park Road, Santa Fe, NM 87501, USA; david.h.wolpert@gmail.com

² Massachusetts Institute of Technology (MIT), 77 Massachusetts Ave, Cambridge, MA 02139, USA

³ Arizona State University, Tempe, AZ 85281, USA

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The following corrections should be made to the published paper [1]:

First, the sentence before Equation (50) on Page 19 should be replaced with the following text: “As a comparison point, we can also evaluate the work used in an impossible scenario where \mathcal{P}_1 varies stochastically, but the organism magically ‘knows’ what each \mathcal{P}_1 is before it receives an input sampled from that \mathcal{P}_1 , and then changes its distributions \mathcal{G}_t accordingly to what the average thermodynamic cost in this impossible scenario would be”. In addition, the following paragraph should be inserted after Equation (50) on Page 19:

“In general

$$\Omega_{Pr}^{\pi} \geq \sum_{\mathcal{P}_1} Pr(\mathcal{P}_1) \Omega_{\mathcal{P}_1}^{\pi} \quad (51)$$

with equality only if $Pr(\cdot)$ is a delta function about one particular \mathcal{P}_1 . So, in general, even if an organism chooses its (fixed) \mathcal{G}_0 to be optimal for an uncertain environment, it cannot do as well as it would if it could magically change \mathcal{G}_0 appropriately before each new environment it encounters”.

Second, the sentence on Page 21, that reads: “Returning to our actual optimization problem, by Lagrange multipliers, the π that maximizes the expression in Corollary 1 is the solution to a set of coupled nonlinear equations, one equation for each pair (x_1, y_1) .” should be changed to: “Returning to our actual optimization problem, by Lagrange multipliers, if the π that maximizes the expression in Corollary 1 lies in the interior of the feasible set, then it is the solution to a set of coupled nonlinear equations, one equation for each pair (x_1, y_1) .”.

Third, the sentence on Page 22: “Solving this set of coupled equations is non-trivial” should be changed to read: “Unfortunately, in general, the solution may not lie in the interior, so that we have a non-trivial optimization problem”.

Fourth, the sentences on Page 23: “This means that the optimizing channel π lies on the edge of the feasible region of conditional distributions. (In contrast, in rate-distortion theory, we want to minimize rather than maximize the objective function, so the optimizing channel lies in the interior of the allowed region.) Note though that in general for different x_1 , the optimal $\pi(y_1 | x_1)$ will put all its probability mass on different edges of the unit simplex over Y .” should be changed to read: “This means that the optimizing channel π may lie on the edge of the feasible region of conditional distributions. Note though that even if the solution is on the edge of the feasible region, in general for different x_1 that optimize $\pi(y_1 | x_1)$ will put all its probability mass on different edges of the unit simplex over Y ”.

We apologize for any inconvenience this may cause. The manuscript will be updated and the original will remain available on the article webpage.

Conflicts of Interest: The author declares no conflict of interest.

Reference

1. Wolpert, D.H. The Free Energy Requirements of Biological Organisms; Implications for Evolution. *Entropy* 2016, 18, 138.



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