CORRIGENDUM: Collective behaviours: from biochemical kinetics to electronic circuits

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This Article contains an error in the order of the figures. Figure 4, Figure 5, and Figure 6 were published as Figure 6, Figure 4, and Figure 5 respectively. The correct Figure 4, Figure 5, and Figure 6 appear below as Figure 1, Figure 2, and Figure 3, respectively.

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**Figure 1** | Schematic representation of an operational amplifier.

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**Figure 2** | Several sets of experimental data (symbols) are fitted by eq. 30 with minus sign (solid line). The values of \( J \) corresponding to the best fits are shown in the table together with the related estimates for \( n_H \) according to eq. 31. The estimates for \( n_H \) obtained via standard Hill fit are also shown.

| data set    | \( J \)     | \( n_H \pm \Delta n_H \) | \( n_H^{\text{fit}} \) |
|-------------|-------------|--------------------------|------------------------|
| Azide       | 3.0 ± 0.1   | 0.25 ± 0.06              | 0.23 ± 0.06            |
| Thiocyanate | 2.5 ± 0.3   | 0.29 ± 0.02              | 0.28 ± 0.06            |
| Cyanide     | 3.0 ± 0.1   | 0.25 ± 0.06              | 0.22 ± 0.05            |
| Imidazole   | 2.7 ± 0.4   | 0.27 ± 0.03              | 0.25 ± 0.05            |
Figure 3 | This figure summarizes all the analogies described in the paper: In the first row, pictures of three biological systems exhibiting cooperativity, namely Mitogen-activated protein kinase 14 (positive cooperativity, panel (a)), Ca²⁺ calmodulin dependent protein kinases II (ultra-sensitive cooperativity, panel (b), and Synaptic Glutamate receptors (negative cooperativity, panel (c) are shown. The related saturation curves (binding isotherms) are shown in the second row (panels (d), (e) and (f), respectively), where symbols with the relative error-bars stand for real data taken from¹⁴,²⁹,₃⁰ respectively and lines are best fits performed through the analytical expression in eq. 28, obtained from statistical mechanics. The related best-fit parameters are $J = 0.14$, $J = 1.16$, $J = 0.29$, respectively. Notice that in panel (d) it is possible to see clearly the “saturation” phenomenon as the first and the last experimental points are far from the linear fit (red line), while are perfectly accounted by the hyperbolic tangent predicted by statistical mechanics (green line), whose correspondence with saturation in electronics is represented in panel (l). Notice further that in panel (e), we compared the ultra-sensitive fit (solid line), with a simple cooperative fit (dashed line): at small substrate concentration the latter case does not match, within its variance, the data points (so accurately measured that error bars are not reported), while the former case is in perfect agreement with data points. In the third row we sketch the cybernetic counterparts, i.e., the operational amplifier (panel (g)), represented as an inverted flip-flop mirroring the symmetry by which we presented the statistical mechanics framework (the standard amplifier is shown in fig. 3), the analog-to-digital converter (panel (h)) and the flip-flop (panel (i)). The (theoretical) transfer functions corresponding to the circuits are finally shown in the fourth row (panels (l), (m) and (n), respectively) for visual comparison with the second one.