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Discussion

Author's Reply to Landauer Defended

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In Norton (2011), I argued that all efforts to demonstrate Landauer's Principle have failed. The proof system used by Ladyman, Presnell, Anthony, and Groisman (2007) and Ladyman, Presnell, and Short (2008) admit processes, such as is above called P_N , that violate the second law of thermodynamics. Ladyman and Robertson (this issue) argue that P_N is not what they call a "controlled operation". Whether it is or not is beside the point. Controlled operations are a proper subset of physically possible processes and P_N is a physical process, produced by combining licit operations in their system, as discussed in Norton (2011, Section 6.2) and in related remarks on "anthropomorphizing" on p. 198.

This last objection adopts the framework of Ladyman et al. solely for purposes of reductio, for the framework is untenable in its entirety. That is shown in Norton (2011, Section 7.4; in press). There, a short, but strong no go result shows that all efforts to demonstrate Landauer's Principle must fail in so far as they suppose that thermodynamically reversible processes can be implemented in molecular scale devices, as

do Ladyman et al. Such processes are fatally disrupted by fluctuations that can only be overcome by creating thermodynamic entropy well in excess of the $k \ln 2$ tracked by Landauer's Principle. I have been unable to discern how Ladyman and Robertson's remarks on fluctuations reverse this no go result.

References

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