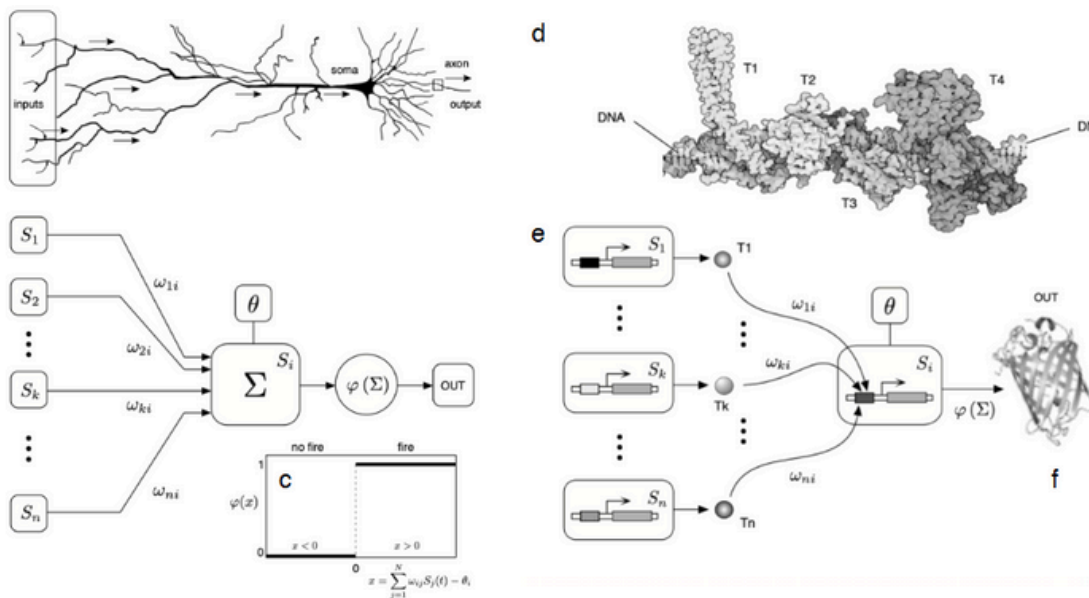


# FUNDAMENTAL CONSTRAINTS TO THE LOGIC OF LIVING SYSTEMS

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27/05/2024 15:00  
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## ABSTRACT

It has been argued that the historical nature of evolution makes it a highly path-dependent process. Under this view, the outcome of evolutionary dynamics could result in a very diverse landscape of complex agents, with very different kinds of forms and functions. At the same time, there is ample evidence that convergence and constraints strongly limit the domain of the potential design principles that evolution can achieve. Are these limitations relevant in shaping the fabric of the possible?

Here, we argue that fundamental constraints are associated with the logic of living matter. We illustrate this idea by considering thermodynamic properties of living systems, the linear nature of molecular information, the cellular nature of the building blocks of life, its open-endedness, the threshold nature of computations in cognitive systems, language and the discrete nature of the architecture of ecosystems. In all these examples, we present available evidence and suggest potential avenues towards a well-defined theoretical formulation.

