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The Emergence of Robustness in Finite Random Discrete Networks NATALI GULBAHCE, Northeastern University, CHRISTOF TEUSCHER, Portland State University — Biological networks are often able to restructure themselves for the efficient and robust execution of a specific task. It has been shown that random Boolean networks possess a "connectivity of stability," [1] where the damage spreading is invariant of the system size N. Here we study the emergence of robustness in such networks by defining robustness as an evolutionary goal and using optimization tools from physics and computer science. We numerically study damage spreading and robustness in finite random discrete networks that undergo change over time in order to investigate how an evolutionary process such complex systems both robust and near-optimal over time. Our results suggest that resource and performance constraints are sufficient for networks to evolve toward a critical connectivity. [1] T. Rohlf, N. Gulbahce, and C. Teuscher. Damage Spreading and Criticality in Finite Random Dynamical Networks. Physical Review Letters, 99, 248701, 2007.

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