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REVIVING THE THEORY OF INFINITE RANDOM GRAPHS

The Rado graph, also known as the countable random graph, plays a central role in model theory, Fraïssé theory, and combinatorics. Up to isomorphism, it is the unique countable graph obtained with probability one when each pair of natural numbers is independently joined by an edge with probability one half. This uniqueness result, proved by Erdős and Rényi, prompted Erdős and Spencer to remark that “the theory of infinite random graphs is demolished by Erdős and Rényi’s theorem.” However, the classical construction relies on repeatedly tossing the same, possibly biased, coin. Our goal is to revive the study of infinite random graphs by allowing a different biased coin for each potential edge. This broader framework allows us to explore how far one can depart from the Rado graph while still obtaining a fixed isomorphism type with probability one. Particular attention is given to the question of which countable graphs can be drawn, that is, obtained almost surely by a suitable choice of edge probabilities.

This is joint work with Jarosław Swaczyna, Ziemowit Kostana, and Leonardo N. Coregliano.