

# Sharp threshold functions for some properties of random groups

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The main objective of the thesis is to study the evolution of the random triangular group, which is a group given by a random presentation with relators of length three. We consider the binomial model of this group in which each relator is chosen independently with a given probability  $p$ . We study the threshold functions for certain group properties such as the property of being a free group, Kazhdan's property (T), hyperbolicity, or the property of collapsing to the trivial group, significantly improving the known results. In particular, we show that many of these group properties admit sharp thresholds. We also exhibit a new period in the evolution of the random triangular group when the group is neither free, nor has Kazhdan's property (T). Our approach is based on relations between random groups and some auxiliary, naturally defined, random graphs and hypergraphs which in turn can be studied by techniques used in the theory of random structures.

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