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Asymptotic proportion of graphical regular representations among Cayley graphs

A Cayley graph whose group of symmetries is as small as its underlying group is called a graphical regular representation (GRR for short) of the group. In this talk we are concerned with the existence of GRRs and their asymptotic behaviour. Here are some natural questions: What kind of automorphism group of a Cayley graph is 'typical'; what kind of Cayley graph is 'common'? Viewing that 'symmetry is rare', a rough guess for the first question would be the groups that are 'as small as possible' in some sense, and one may guess for the second question that the Cayley graphs with the lowest level of symmetry would be the most common ones. We estimate the number of GRRs of a given group with large enough order and, based on some previously known results, show that almost all finite Cayley graphs have full automorphism groups 'as small as possible'. This confirms a conjecture of Babai–Godsil–Imrich–Lovász.