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Techniques and concepts of amenability of discrete groups.

The subject of amenability essentially begins in 1900's with Lebesgue. He asked whether the properties of his integral are really fundamental and follow from more familiar integral axioms. This led to the study of positive, finitely additive and translation invariant measure on reals as well as on other spaces. In particular the study of isometry-invariant measure led to the Banach-Tarski decomposition theorem in 1924. The class of amenable groups was introduced by von Neumann in 1929, who explained why the paradox appeared only in dimensions greater or equal to three, and does not happen when we would like to decompose the two-dimensional ball. In 1940's, M. Day defined a class of elementary amenable groups as the largest class of groups amenability of which was known to von Naumann. We will give a current state of the subject of non-elementary amenable groups. (Received August 10, 2015)