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Massachusetts Avenue, Cambridge, MA 02139. *Conjugacy classes and group
representations*. Preliminary report.

The conjugacy classes in a group carry a lot of nice information in an easy-to-understand package: conjugacy classes of permutations are classified by their cycle decomposition, and conjugacy classes of matrices by (more or less!) their eigenvalues. The sizes of conjugacy classes measure how noncommutative the group is.

The representations of a group offer much more information, but in less agreeable packaging: it is not so easy to say even what the representations of a permutation group are, for example.

An idea of Kirillov and Kostant from the 1960s seeks to describe (abstract and mysterious) representations in terms of (concrete and geometric) conjugacy classes. I'll recall what their idea looks like; some of its classical successes; and some ways that it fits into modern mathematics. (Received June 18, 2015)